

Assessing BC's Policies to Encourage a Sharp Reduction in GHG Emissions by Light Vehicles in BC's Transportation Sector

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Abstract

On April 10, 2019, the Government of BC introduced Bill 28, the Zero-Emissions Vehicles Act¹ and are preparing regulations under the new legislation. This is the latest in a decade of initiatives in BC to encourage the use of less polluting more energy efficient vehicles with the ultimate objective of significantly reducing carbon emissions in the transportation sector.

This paper reviews BC's efforts to reduce GHG's by addressing a series of questions to assess the effectiveness of BC's laws, policies and incentives. It proposes measures that will increase the effectiveness of laws, policies and initiatives in actually reducing GHG's in BC's transportation sector and the impact of other industrial decisions on the amount of global GHG's originating in BC. It references the increasing number of studies indicating that Global Warming is advancing at a much faster rate than has been accepted by most governments and citizens alike.

Executive Summary

BC has trumpeted itself as a leader in reducing carbon emissions in North America and in Canada in particular. It was the first jurisdiction in North America to introduce a carbon tax at the consumer level and has made much of this brave and green initiative. However, BC's GHG emissions record does not justify that claim.

In the transportation sector, gasoline sales have increased by some 10.5% since the carbon tax was introduced and 13.8% above its low point in 2013. This is due in large part to consumers decisions to purchase more light trucks and SUV's than more efficient cars. Light trucks and SUV's comprised 72% of new vehicles purchased in 2018, up from some 47% in 2008 and a much lower percentage than that 20 years earlier.

There has been too much reliance on a small carbon tax, which was frozen in 2013 and remained frozen until 2018 and is just \$40/tonne or 8.89¢/litre today. The weekly price of gas can fluctuate more than that. At such a low rate, the carbon tax has not been enough of a disincentive to encourage people to switch from buying gas-guzzlers and buying more fuel-efficient vehicles instead. With the oil industries upward push of gasoline prices in BC by some 30¢/litre in the spring of 2019 to \$1.62/litre², combined with larger incentives to buy electric and hybrid vehicles and with more models of both available, there has been a sharp increase in EV sales late in the Spring of 2019.

¹ Bill 28 passed third reading on May 29, 2019

² That's for regular gas in Victoria, in Vancouver the price hit \$1.70/litre

BC's inability to collect accurate and timely data on vehicle sales data hampers BC's ability to build policies that would reduce GHG emissions in the transportation sector. There is little incentive for ICBC to build its data collection and reporting capacity as it is not compensated by the province for providing \$130 million worth of Motor Vehicle Branch functions and has bigger fish to fry with its structural billion-dollar losses on its vehicle insurance business.

The province subcontracts all its clean vehicle incentives to the New Car Dealers Association (NCDA) to administer. This is not in the citizen's interest as purchasers cannot bargain effectively with a dealer who controls who gets the government rebates for buying an EV or eligible hybrid. Dealers who are not members of the NCDA do not have access to the rebates for their customers. Individuals who import used EV's cannot access government rebates. BC residents have to buy a used EV from a NCDA dealer who imports used EV's to have access to the rebate. These rebate and incentive programs should be run by neutral agency. It makes sense for that agency to be ICBC as they register all vehicles in BC and the administration would be much simpler and efficient if done by ICBC.

The goals of the new *Zero-Emission Vehicles Act* to increase the number of ZEV's are unambitious and will likely be exceeded without the Act. Countries like Norway and the Netherlands are banning ICE vehicle sales by 2025. BC's 2025 goal is only 10%, of new vehicle sales to be ZEV's and does not achieve 100% until 2040.

Addressing Climate Change demands we push much harder. It will take more than just a much larger carbon tax. We need sticks as well as carrots. Registering high emission gas guzzlers costs little more than an EV, why? We need low-cost regulatory actions as well. The vast majority of auto industry advertising is for gas guzzlers. We don't allow tobacco manufacturers and retailers to advertise their harmful products. Why, when we know petroleum fueled vehicles are contribution so much to global warming, do we allow advertising of gas guzzling ICE vehicles? This is low hanging fruit.

If the province is unwilling to regulate our way to more efficient vehicles before 2025 let alone 2040, give the municipalities/regional governments and First Nations the capacity to regulate vehicles registered in their jurisdictions and establish congestion charges. BC did that with smoking restrictions, why not vehicles?

To have credibility and validity, initiatives to reduce GHG's must not be countered by other government policies and initiatives that ignore GHG emissions or will dramatically increase emissions originating in BC. Methane's Global Warming Potential (GWP) over 10 years is 108 times CO₂, 86 times over 20 years and 34 times CO₂'s GWP over 100 years according to the most recent report by the IPCC.

Yet BC is turbocharging the natural gas industry when we know its lifecycle (well to final combustion) emissions are as bad as coal. The LNG Canada project's lifecycle emissions alone will add 138% to BC's total inventory of GHG's in 2016.

On June 17th, Parliament declared a Climate Emergency, with strong Liberal support. The next day, the federal government gave final approval to tripling their Trans Mountain pipeline's capacity. The expansion's lifecycle GHG emissions will be 290%

of BC's current GHG emissions inventory. PM Trudeau claims Canada can dramatically the expand oil and gas economy and cut GHG emissions at the same time.

No wonder citizens are skeptical.

By electrifying our energy supply, we eliminate GHG's and all the nasty side effects of fossil fuels from health and environmental concerns to the long-term economic costs and dependency associated with fossil fuel use. We have a particular advantage in our abundant hydro resources and untapped solar, wind and geothermal potential and our moderate climate.

No Alberta premier could threaten BC with an oil embargo or a substantial increase in the price of oil and gas products if we did not disregard our interior and our coastline with pipelines and more tanker traffic. Oil would no longer be a significant factor in our lives.

Tackling Global Warming is Mankind's greatest challenge. BC and Canada have to stop the duplicity. We need to count carbon as carefully as we count dollars. We can't ignore the emissions on the oil and gas we export and be honest.

It takes guts to tackle GW both in government policy and action and in citizens individual actions. The battle has just begun.

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Background – GHG Emissions in BC

BC's recognized 2016 GHG emissions were 62.3 MT CO₂-e, up 2.4 MT (4.1%) over 2010 according to the Provincial Greenhouse Gas Emissions Inventory³.

Environment Canada pegs BC's 2017 emission at 62.1 MT CO₂-e but emissions may have increased beyond this now as BP's just released *Statistical Review of World Energy* reports increases in North America and around the world with GHG emissions increasing faster (+2%) in 2018⁴ than they have in the previous seven years despite all the warnings from climate scientists. It is critical to recognize that BC's emissions are significantly lower than the BC's ultimate GHG emissions. We

³ <https://www2.gov.bc.ca/gov/content/environment/climate-change/data/provincial-inventory>

⁴ <https://www.carbonbrief.org/in-depth-bp-data-reveals-record-co2-emissions-in-2018-driven-by-surging-use-of-gas>

know that methane leakage from BC's natural gas extraction, processing and transportation are significantly underestimated⁵. And we know that GHG's emitted by exported coal (~100 MT CO₂-e), oil and natural gas are not accounted for in BC, but in the countries that import and burn these fossil fuels. And of course, we do not account for the carbon embedded in all the goods we import from other countries.

Of BC's GHG Inventory's recognized 62.3 MT CO₂-e, 24.9 MT (40%) are directly related to transportation in BC. Of this, 17.3 MT (69.5%) are emitted on our streets and roads. 9.7 MT (56%) of road related emissions are emitted by Light Duty vehicles (half-ton trucks, SUV's, vans and passenger cars).

The accelerating incidence of CO₂ emissions into our Earth's atmosphere (415 ppm today or 45% above pre-Industrial times and climbing rapidly) is inexcusable and deadly. Including more powerful human-generated GHG's like Methane (CH₄ is 108 times more powerful (GWP) than CO₂ over 10 years, 86x times over 20 years and 34x over 100 years) and nitrous oxide (N₂O is 275 times more powerful than CO₂ over 20 years and 296x over 100 years⁶), the CO₂ equivalent (CO₂-e) level hit 500 ppm this year⁷.

The clarion call for much more rapid GHG reductions by all nations and especially developed nations from the Paris COP21 and Polish COP 24 conferences, demands that we take serious efforts to dramatically reduce GHG emissions using policies and practices that actually reduce emissions and are not simply lame commitments to be achieved under future governments. The UN's leading experts warn that we humans only have 11 years in which to correct the problem⁸, which means the earlier we start significant reductions (-45% within a decade as recommended by the IPCC), the easier it will be to adapt to the new reality of zero GHG emissions within 30 years⁹.

Since I began working on this paper in late 2018, there have been weekly, sometimes daily major reports illustrating the advanced state of global warming released from various institutes and agencies. For example, while editing last week, NASA announced that Antarctic sea ice declined by some 2,000,000 km² between

⁵ See St. F.X.U.'s Flux Lab ground based reports on the Montnay field alone. BC Gas & Oil Commission seems to have closed its eyes to this problem and has yet to use existing Canadian technology such as GHGSat's satellite-based technology or even aerial based spectrometry to properly assess the volume at which methane is leaking from BC's gas operations. Yet, governments have committed to reducing this unknown number by 45%.

⁶ <https://www.ipcc.ch/site/assets/uploads/2018/03/TAR-06.pdf> , page 389

⁷ <https://www.juancole.com/2019/06/climate-disaster-dangerously.html>

⁸ <https://www.theguardian.com/environment/2018/oct/08/global-warming-must-not-exceed-15c-warns-landmark-un-report>

⁹ <https://www.sciencenews.org/article/global-warming-limit-degrees-ipcc-climate-change>

2014 and 2017¹⁰. Two days later, on July 3rd, the Council of Canadian Academies released their expert panel's report *Canada's Top Climate Change Risks* identified 12 major climate change risks facing Canada¹¹. Every week the scientific research gives more dire evidence¹².

We have known for years that GHG emissions from the oil and gas industry are significantly under-reported. In April of 2019 we learned that the Tar Sands extraction companies are grossly under-reporting their emissions. Flying 17 missions lasting 80 hours over 4 major Tar Sands plants in 2013, the researchers' measurements of GHG's in the air above the facilities averaged 64% higher than the companies reported emissions. The study found that "the gap between the facilities' reported carbon dioxide emissions and the levels calculated by researchers was 13% for the Suncor site, 36% for the Horizon mine, 38% for Jackpine and 123% for Syncrude."¹³ It was interesting to note that major newspapers and broadcasters did not give this front page coverage. Most buried it in their less read business sections.

Governments are complicit in this under-reporting as they leave most reporting up to the companies themselves and make little or no effort to conduct independent assessments despite rapidly advancing and readily available remote sensing technologies, led by Canadian satellite firm GHGSat¹⁴ and St. F.X.U.'s Flux Lab¹⁵.

Due in part to our Northern Latitude and the melting of the Arctic Sea Ice, Canada is witnessing warming at twice the Global average¹⁶, three times in our Arctic. Southern BC is warming at 2 times and northern BC perhaps 2.4 times and high-altitude areas of BC at 3+ times the Global average. Switzerland's Crowther Lab's July 10th report notes Seattle's maximum temperature could rise 6.1°C with the average rising by 2.6°C by 2050¹⁷. Most of BC's population lives in the same climatic zone.

History of BC's Carbon Tax. Comparing Carbon Taxes. What impact has BC's Carbon Tax had so far?

BC introduced a \$10/tonne (2.4¢/litre) carbon tax in 2008, 18 years after Finland introduced the World's first carbon tax in 1990 and 17 years after Sweden introduced the first significant carbon tax of \$40/tonne in 1991.

¹⁰ <https://www.newscientist.com/article/2208180-antarctic-sea-ice-is-declining-dramatically-and-we-dont-know-why/>

¹¹ <https://cca-reports.ca/wp-content/uploads/2019/07/Report-Canada-top-climate-change-risks.pdf>

¹² <https://nsidc.org/arcticseaicenews/>

¹³ <https://canadians.org/blog/air-quality-reports-reveal-tar-sands-emissions-higher-companies-report>

¹⁴ <https://www.ghgsat.com>

¹⁵ <http://fluxlab.ca>

¹⁶ <https://changingclimate.ca/>

¹⁷ <https://www.theguardian.com/environment/2019/jul/10/global-heating-london-similar-climate-barcelona-2050>

BC's carbon tax was introduced as "revenue neutral" to pave the way for more cuts to income taxes (the BC Liberals cut personal income tax by 25% on the day they were sworn in 2001). Revenue neutral meant that any net carbon tax collected was to be offset by income tax cuts – and most of this went to cutting corporate income taxes¹⁸. In May of 2013, Liberal Premier Christy Clark announced a 5-year freeze on BC's Carbon Tax at \$30/tonne. The freeze was lifted in 2018 by the newly elected NDP government when it rose to \$35/tonne.

Clear Gasoline Tax Rates per Litre			
Type of Tax	South Coast British Columbia Transportation Service Region (Vancouver Area)	Victoria Regional Transit Service Area (Victoria Area)	Remainder of the Province
Dedicated Motor Fuel Tax – TransLink (Vancouver)	18.50¢	N/A	N/A
Dedicated Motor Fuel Tax – BC Transit (Victoria)	N/A	5.50¢	N/A
Dedicated Motor Fuel Tax – BCTFA	6.75¢	6.75¢	6.75¢
Provincial Motor Fuel Tax (general revenue)	1.75¢	7.75¢	7.75¢
Total Motor Fuel Tax	27.00¢	20.00¢	14.50¢
Carbon Tax	8.89¢	8.89¢	8.89¢
Total Provincial Tax	35.89¢	28.89¢	23.39¢

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It is not simply the "carbon tax" that affects the price of fuels, it is a combination of federal and provincial fuel taxes embedded in a litre of fuel as well as the base cost of the fuel and margins added at the production, wholesale and retail levels. When BC's gasoline costs soared some 30¢/litre in the Spring of 2019, it was the oil

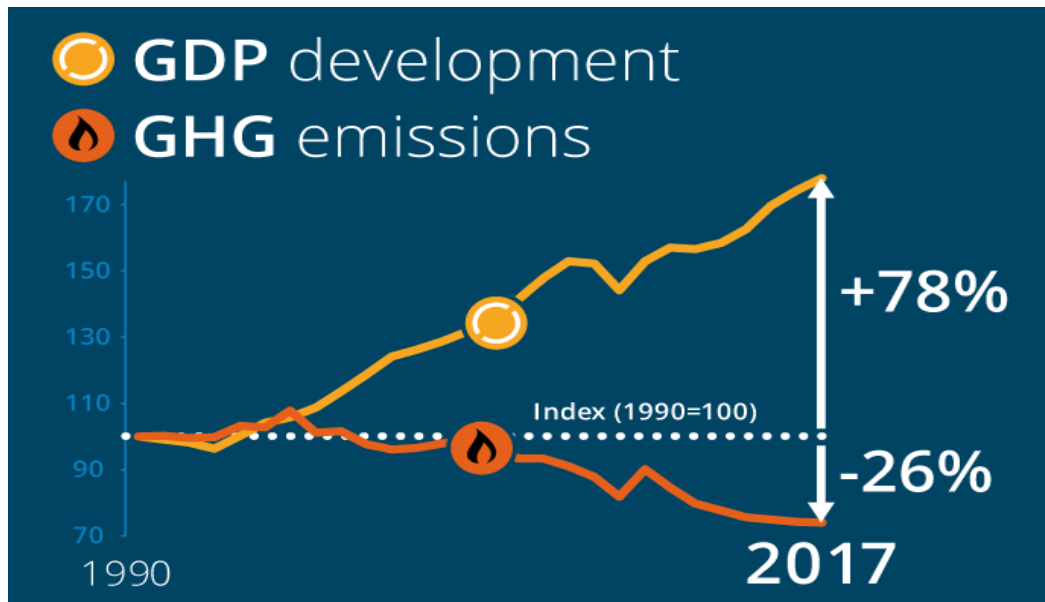
¹⁸ <https://www.fraserinstitute.org/sites/default/files/examining-the-revenue-neutrality-of-bcs-carbon-tax.pdf?language=en>

¹⁹ <https://www2.gov.bc.ca/assets/gov/taxes/sales-taxes/publications/mft-ct-005-tax-rates-fuels.pdf>

industry margins that soared, the only tax increase was a 1.1¢ increase in the carbon tax on April 1st. The Federal 5¢/litre excise tax on gasoline has not changed since 1995 and their 4¢/litre excise tax on diesel since 1987²⁰. Excise taxes on gasoline in the other provinces range from 13¢/litre in Alberta to 19.2¢/litre in Quebec and 20.5¢ in Newfoundland and Labrador.²¹ The new federal carbon tax being applied to provinces that do not have their own carbon taxes is 4.42¢/litre in 2019.²²

As of April 1, 2019, BC’s carbon tax is \$40/tonne or 8.89¢/litre (matching Sweden’s 1991 levy). BC’s tax will rise to \$50/tonne (11.11¢/litre) in 2021 to match Canada’s projected carbon tax at that time. It is no longer “revenue neutral” as the new NDP stopped that ruse in 2018 as well as other carbon reduction scams such as making government departments and their public service delivery agents like health authorities (hospitals) and school boards and universities buy carbon credits from the BC Carbon Trust if they failed to cut their emissions (with little if any money from the BC government to invest in upgrading the energy efficiency of their public buildings). This was a devious way to have public money further subsidize very expensive private sector independent power producers as the hospital and school board penalty money was “invested” in IPPs to build private sector renewable energy electricity plants under long-term contracts worth billions of dollars to produce excess capacity which BC Hydro did not need but was forced to buy at rates some 10 times BC Hydro’s cost of producing electricity.

Sweden’s carbon tax is currently C\$170/tonne or 37.78¢/litre., 4.2 times BC’s



²³ SWEDEN GDP GROWTH AND GHG EMISSIONS REDUCTIONS SINCE 1990

²⁰ <https://www.nrcan.gc.ca/our-natural-resources/domestic-and-international-markets/transportation-fuel-prices/fuel-consumption-taxes-canada/18885>

²¹ Ibid.

²² Ibid.

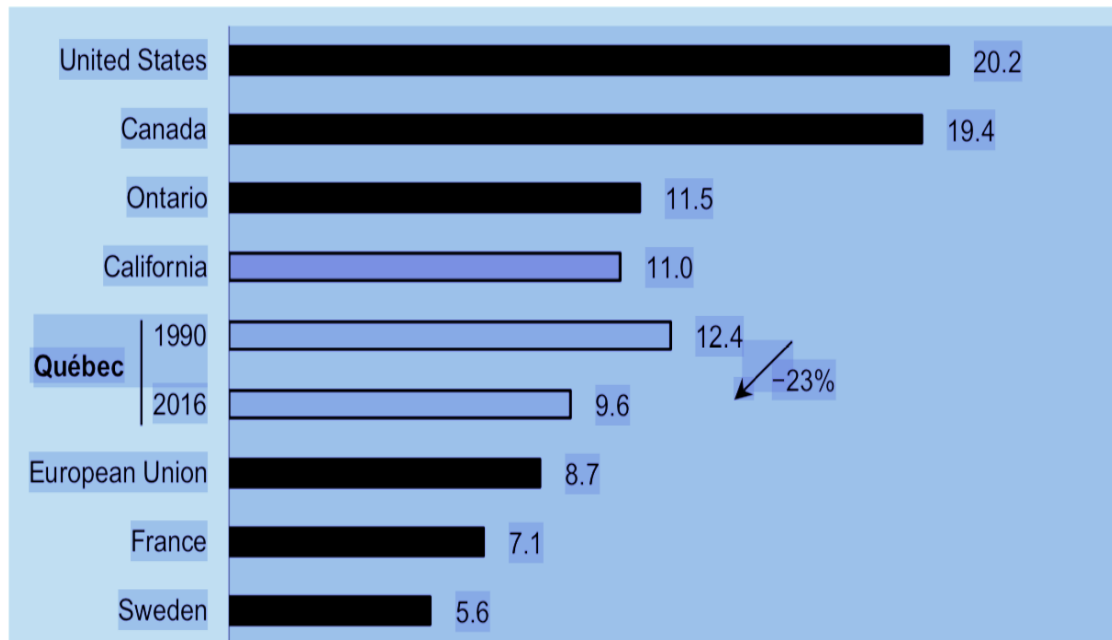
²³ <https://www.government.se/government-policy/taxes-and-tariffs/swedens-carbon-tax/>

current rate and 3.4 times what BC's and Canada's will be in 2021. Sweden's comparatively huge carbon tax has not have killed Sweden's economy. Quite the opposite, as their GDP has grown quite well, keeping pace with or outpacing BC's and Canada's since the Swedes introduce their carbon tax in 1991.

Sweden has decreased their GHG emissions by 26% since 1990, despite their northern latitude with a cold climate similar to Quebec's, while Canada's GHG emission have increased 18% and BC's by 22%.²⁴

Quebec's 2017 GHG emission have fallen 9.4% (22% to 9.1 tonnes per capita) despite a 22% rise in the transportation sector²⁵. BC's GHG emission are 12 tonnes per capita, 2 times Sweden's and 32% higher than Quebec's, both of which have much colder climates. Here are some international 2016 comparisons of GHG emissions from Quebec's 2019 Budget documents:

Comparison of GHG emissions in selected jurisdictions
(tonnes of CO₂ equivalent per capita, 2016 unless otherwise indicated)



Sources: Statistics Canada, Environment and Climate Change Canada, Eurostat, California Air Resources Board, United States Census Bureau, United States Environmental Protection Agency, Ministère de l'Environnement et de la Lutte contre les changements climatiques and Ministère des Finances du Québec.

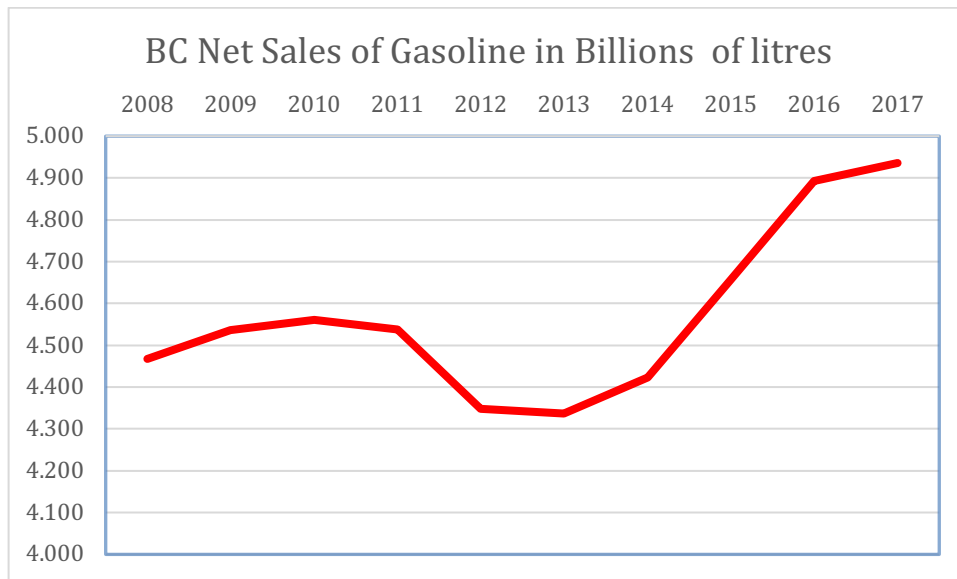
²⁴ <https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions.html>

²⁵ http://www.budget.finances.gouv.qc.ca/budget/2019-2020/en/documents/BudgetPlan_1920.pdf

Environment Canada reports that in 2005, just three years before BC introduced its carbon tax, BC's GHG emissions were 63.1 MT or just 1 MT more than 2017. Some estimate that 2018's emission may be slightly more²⁶ than 2017's²⁷, so we can safely say that BC's emissions are pretty static now but will expand dramatically with the development of the LNG industry.

BC's GHG Inventory data clearly illustrates that emissions by Light Duty vehicles has increased substantially. The 3-Year trend for Light Duty Gasoline Cars is up 10.3%, reversing small declines in the previous 7 years. For Light Duty Gasoline Trucks, the 10-year trend is up 32.8%. Light Duty Diesel Truck's 10-year trend emissions are up a whopping 152.6%²⁸.

This is consistent with net gasoline sales in BC which have increased by 13.8% from 4.336 billion litres in 2013 to 4.936 billion litres in 2017²⁹.



BC has witnessed a massive shift in new vehicle preferences away from more fuel-efficient cars and towards gas-guzzling light trucks, SUV's and higher horsepower cars. 2008 was the last year in which cars outsold trucks in BC and co-incidentally the year BC introduced Canada's first carbon tax. Today 72% of new vehicle sales in BC are classified as Light Trucks: that is half-tons (the leading sellers), SUV's, mini-vans and vans. What's worse? All these comparative gas guzzlers will be on our

²⁶ <https://nationalpost.com/news/world/u-s-greenhouse-gas-emissions-spiked-in-2018-and-it-couldnt-happen-at-a-worse-time>

²⁷ <https://news.un.org/en/story/2018/11/1026691>

²⁸ <https://www2.gov.bc.ca/gov/content/environment/climate-change/data/provincial-inventory>
See link to spreadsheet "2016 Provincial Inventory"

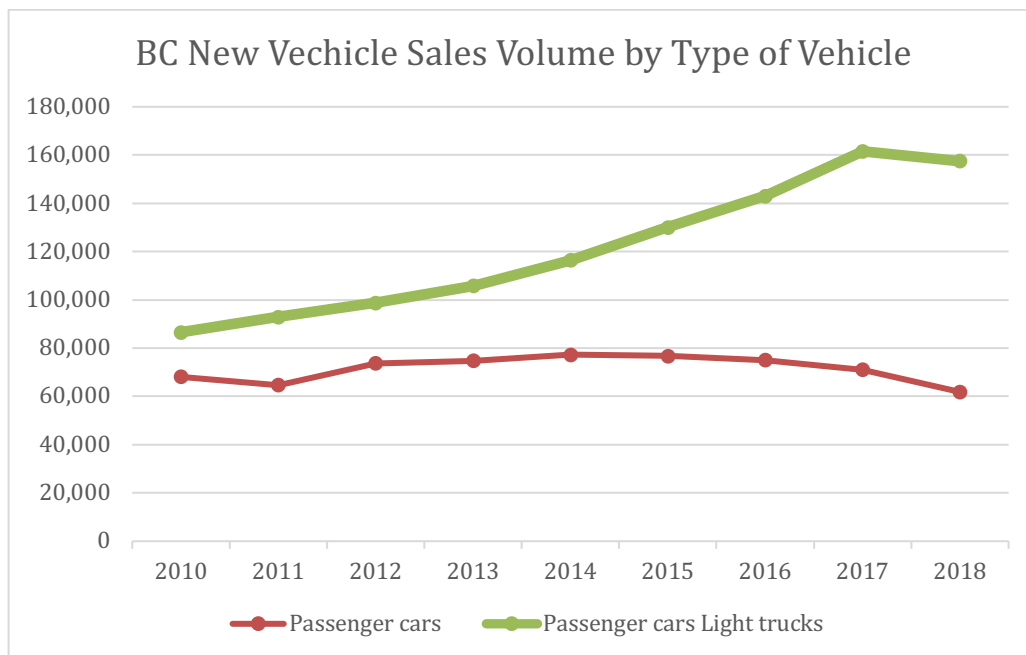
²⁹ <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=2310006601&pickMembers%5B0%5D=1.11>

roads for some 15+ years to come. Vehicle sales in the past decade and today's vehicles sales determine the majority of our emissions for the next 20 years.

Under the new ZEV legislation, most of the cars on the road in 2040 could still be consuming gasoline and emitting GHG's. That's 10 years after the IPCC says we have to reduce GHG emissions by 45% and just 10 years before their conservative forecasts say we must end the burning of all fossil fuels.

This represents a huge policy failure in a province that has claimed leadership in Climate Change initiatives.

It is clear that a small carbon tax on its own has have little if any impact (the evidence says none) on the publics' collective decision to buy more fuel-efficient vehicles. Our love affair with half-tons and SUVs continues unabated.



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On June 13, 2019, the Parliamentary Budget Office report, *Closing the Gap: Carbon pricing for the Paris Target* states that Canada's carbon tax has to effectively double to \$102 per tonne by 2030 for Canada to achieve our international commitment to reduce carbon emissions by 30% below 2005 levels by 2030³¹.

Shockingly, the Federal Minister of the Environment, Catharine McKenna, dismissed the PBO report and pulled a Christy Clark by announcing that the Federal carbon tax

³⁰ Table: 20-10-0002-01 (formerly CANSIM 079-0004), Note StatsCan's BC numbers include sales in the 3 Territories. Light Trucks definition includes Pick-ups, Mini-Vans, Vans and SUVs

³¹ https://www.pbo-dpb.gc.ca/web/default/files/Documents/Reports/2019/Paris_Target/Paris_Target_EN.pdf

would be capped at \$50 per tonne (11.5¢/litre) in 2022 if the Liberals are re-elected this fall.

Why would anyone expect a 2.4¢ to 11.5¢ per litre tax to deter gasoline consumption or the decision to buy a gas guzzler when it took a 27.5¢ per cigarette (\$6.88/pack of 25) to deter tobacco consumption significantly?

A \$50 bottle of whisky includes some \$28/litre in BC tax alone, and a litre bottle of craft beer a dollar. Yet, climate changing fossils fuels like gasoline are to be limited to 11.5¢/litre by 2022 and Ms. McKenna thinks that will be sufficient to change people's behaviour.

Recommendation:

1. *Quadruple the annual increases in BC's Carbon Tax to \$20/tonne (4.4¢/litre) annually along with other measures recommended in the section below. It would still take BC seven years to equal Sweden's current rate.*

Do EV's really reduce GHG emissions? How do they compare with gas and hydrogen vehicles with respect to carbon emissions?

Using the Fischer-Tropsch method of converting total energy involved in its production and consumption to the application, the UK's Transport & Environment³² department calculated a "well to wheel" comparison between electric, gas and hydrogen powered vehicles. Their results are revealing.

- A gas vehicle is only 13% efficient (total energy making it to the tires and onto the road thus propelling the vehicle).
- A hydrogen vehicle is almost as bad as gasoline, being only 22% efficient.
- An electric vehicle is 73% efficient in getting the total energy in the battery to the road, making it 5.6 times as efficient as a gas- or diesel-powered vehicle.

This efficiency translates directly to GHG emission reductions. With most of BC's electricity being renewable, EV's GHG emissions are over 95% lower than gasoline vehicles and some 80-85% lower than natural gas derived hydrogen fuel cell powered vehicles.

³² https://www.greencarreports.com/news/1113175_electric-cars-win-on-energy-efficiency-vs-hydrogen-gasoline-diesel-analysis

Bill 28, Zero-Emission Vehicle Act. What's the purpose and will it work? Are its EV sales targets (10% new sales by 2025, 30% by 2030 and 100% by 2040) too low or too high, and why?

Bill 28's ZEV goal is to phase out the sale of ICE vehicles over the next 20 years. However, the targets are unambitious and will occur without this act. BC may beat the 2025 goal by 2022 – barely three years after the target was announced. It's been reported that Tesla delivered 800 EV's in a one-week period in May and has been delivering at a rate of 80-120 cars a day since then. Hyundai and Kia can't keep up with demand in BC and buyers face months of waiting for longer range models. Setting goals so low they present no challenge mocks the purpose of goal-setting.

The Zero-Emission Vehicle Act's³³ technical nature makes it difficult to understand and it promises to be somewhat complex to administer. The legislation establishes the framework with the nuts and bolts of how it works to come under its regulations which are still under development and may be for some time. It's another example of a nudge law with its principle to use credits and debits attached to vehicles determined by their emissions to eventually reduce emissions. It is aimed at manufacturers, not consumers as manufactures will only be able to sell gas and diesel vehicles if they have enough credits from EV sales or purchased from others to achieve a positive 'balance' in their 'account'. Manufactures with negative balances in their accounts will have to buy credits from manufactures with surplus credits. The idea is to give manufactures lots of notice on their need to introduce more ZEV models so they will achieve a balanced account.

In comparison, Norway and the Netherlands have announced that they are banning the sale ICE vehicles by 2025³⁴. It is possible that few if any gas or diesel only cars and light trucks will be made by 2030, with most production moving to BEV by then. Toyota will primarily be offering hybrid vehicles after 2022 and is rushing to catch up on EVs. Already, I'm told half the sales of Toyota's 9 models with hybrid options in BC are hybrids. Other automakers have similar strategies, many moving to full EV's rather than hybrids. Campus Nissan likely sells more Leafs than any other model – especially when you consider the used ones they import from the USA.

China and EU based companies are moving to pure BEV's at a very rapid rate. Chinese companies produced some 1.16 million BEV's³⁵ in 2018, half the world's total production, which is increasing rapidly. Volvo has announced it will produce only hybrids and BEV's after 2019, with 5 new EV models by 2021.³⁶ Mercedes, BMW, Volkswagen, Jaguar and Japanese car makers are all rushing BEV and hybrid

³³ <https://www.leg.bc.ca/parliamentary-business/legislation-debates-proceedings/41st-parliament/4th-session/bills/progress-of-bills>

³⁴ <https://www.theguardian.com/technology/2016/apr/18/netherlands-parliament-electric-car-petrol-diesel-ban-by-2025>

³⁵ <http://www.ev-volumes.com>

³⁶ <https://www.cbc.ca/news/business/volvo-hybrid-electric-2019-1.4190649>

models into production. VW just announced and new sub \$25,000 BEV cross-over – and some 7,500 layoffs because making EV's is much less labour intensive than building ICE vehicles.

Tesla is already the leading mid-sized luxury car seller in the USA, selling more Tesla Model 3's than Mercedes C, BMW 3, Lexus ES & IS and Audi A4 combined towards the end of 2018. Tesla's Model 3 was responsible for **32%** of all small/medium luxury car sales in the USA in December and **five times** the North American manufactures' offerings in this range of vehicles. In the first half of 2019, the Model 3 out sold all its competitors combined³⁷. While other manufactures auto sales are declining, Tesla is marching ahead and setting production records, despite continuing financial challenges as it invests heavily in expanding production capacity and new models and batteries in the US and China. EV's seem to be the primary area of sales growth in a year when vehicle sales have been declining worldwide.

As noted above, Tesla's sales in BC are soaring. They are seen as such a threat to other premium automakers, that auto dealers in the Victoria area are buying up retail space to delay Tesla's ability to set up a retail store and service centre in Victoria.

In Europe EV's are taking flight as well, led by Norway where almost half the new cars sold in are EV's. In March 69% of Norway's new car sales were BEV's, with Tesla's Model 3 representing 33% of all new vehicle sales³⁸. In the Netherlands, the Model 3 was the top selling car in the country and in Sweden, 13% of new car sales are EV's with Tesla representing half of those EV sales. In comparison, it was estimated that EV's represent less than 4% of new car sales in BC in 2018.

North America's Big 3 are fixated on trucks and are far behind their competitors in BEV's. GM's production of their Bolt and Volts has been very constrained since they were introduced. It's been very difficult to find them at dealers. GM recently announced that they are discontinuing the Volt. Ford has had an Electric Focus but again its numbers are very limited as they focus on half-tons and SUV's. Similarly, Ford's small SUV hybrids have not been marketed aggressively. If this continues, the Big 3 may all be bankrupt by 2025, creating even more room for the electrics by Tesla and foreign firms. It's not as if the old Big 3 have not gone bankrupt before.

GM, recognizing it is way behind the curve, has just announced an ambitious \$300 million plan to introduce more EVs, but that is much less than they are investing in ICE vehicles. Ford is developing a BEV F 150 and apparently Chrysler and GM are following suit with their half-tons. It may be too little, too late. Rivian is releasing

³⁷ <https://cleantechnica.com/2019/07/25/7-top-takeaways-from-teslas-q2-conference-call/>

³⁸ <https://insideevs.com/electric-car-sales-norway-march-tesla-model-3/>

their half-ton within a year and Tesla may launch theirs in 2020 as well. To not miss out entirely, in April Ford invested in \$500 million in Rivian³⁹.

Consumers are adopting new technologies at a much faster pace than in the past, taking much less than a decade to make wholesale moves into new technologies. Don't expect auto's to be any different from other desired consumer items.

Recommendation:

1. *Advance the targets for the Zero Emissions Act so we can meet the IPCC's defined need to reduce GHG emissions by 45% by 2030 and 100% by 2050. That will require that ICE new vehicle sales cease by 2035 at the latest.*
2. *Reset BC's targets to 30% by 2025, 50% by 2030 and 100% by 2035.*

What's with the emphasis on Hydrogen?

While the province is being dragged into the hydrogen mania, it is ill-advised as hydrogen is a much more expensive option than EV's, especially in infrastructure (a million dollars plus per station), operating costs, consumers costs, convenience and GHG emissions.

While everyone can charge an EV at home with a standard 120v 15 AMP plug or with a faster 220v 20-32-40 AMP plug, no one will be able to afford a home-based, likely noisy hydrogen extraction machine. The lifecycle energy efficiency of hydrogen is grossly inferior to BEV's. It takes a lot of electricity to extract Hydrogen from the atmosphere, and most Hydrogen is currently extracted from natural gas, so hydrocarbons are still involved in the process with resulting carbon emissions.

Commercial hydrogen is made from natural gas/methane and 5.5 kg of CO₂ is emitted to make 1kg of hydrogen, that's hardly "clean". A hydrogen vehicle only reduces GHG's 34%⁴⁰ below a gasoline powered vehicle whereas a BEV vehicle reduces emissions by some 95%.

When created by electrolysis it takes 60 kWh to make 1 kg of hydrogen, which will propel a small hydrogen fueled car for about 100 km. That 60 kWh would fully charge two 30 kW Leaf's (200 km each) or a Model 3 Tesla which will go 500 km. on a 60-kWh charge. That's 4 to 5 times as efficient as the hydrogen car. Hydrogen makes no environmental sense. For comparison, 60 kWh is 33% more than the total energy demand of my home on a winter day and almost three times a summer day's electricity demand.

Hydrogen is extremely difficult to store and transport because it reacts with most elements. It leaks through stainless steel so storage is a big problem and existing

³⁹ <https://finance.yahoo.com/news/tesla-rival-rivian-says-ford-124823338.html>

⁴⁰ <https://www.ucsusa.org/sites/default/files/attach/2014/10/How-Clean-Are-Hydrogen-Fuel-Cells-Fact-Sheet.pdf>

pipelines could not be used as they would leak like a sieve. While not wanting to push any alarm buttons, safety is also an issue. Despite there being very few commercial filling stations worldwide, at least three have had explosions and fires; one in Santa Clara, California⁴¹ on June 1, 2019 and now one in Norway on June 10, 2019. In response to the Norwegian explosion, both Toyota and Hyundai have suspended sales of their hydrogen vehicles in Norway⁴².

Despite the active promotion by a few auto manufactures and gas companies, any money available would be much better spent in enhancing EV charging networks and accelerating the adoption of EV's. The companies primarily promoting hydrogen, Hyundai, Toyota and Honda, have just announced a massive shift to BEV's as they realize that they are on the wrong bus.

The cheapest Hydrogen vehicle is nearly \$77,000, coincidentally the initial price limit⁴³ for a rebate under the most recent version of BC Clean. There are only a dozen or so Hydrogen fueled vehicles in BC (2 in Greater Victoria) and virtually all are owned by government agencies. There will be more than 10,000 EV's on the road in 2019, and that number is compounding at a rate of over 30% annually. New EV sales have been compounding at an average rate of 78% annually since 2012.

And hydrogen is expensive. Based on California costs, it is estimated to cost about \$19/kg. A car with at 500 km range would cost almost \$100 to fill @ 100 km/kg. That's more expensive than most gasoline cars even at today's high costs in BC, and as expensive as an old Chevy Van. BC's scheme to reduce the price of carbon uses a complex trading / selling carbon credits to high emitters – a somewhat perverse set-up created to serve/create a carbon market trading industry in the hope of nudging big emitters to reduce emissions.

For BC, it makes far more sense to scrap the estimated \$10 million hydrogen fueling station program and \$6,000⁴⁴ per car subsidies (\$1,000 more than a BEV) and focus on what we know works, is more efficient, services a thousand times more residents, uses BC Hydro's electricity efficiently and is much safer - EV's.

\$10 million will only build a few Hydrogen fueling stations that can only fuel 20 vehicles a day each. That same \$10 million would fund some 4,000 L2 electric charging stations or 150 L3 DC or Supercharging stations on highways throughout BC or some combination of the two. In terms of publicly available chargers, both DC Quick Chargers (L3) / Superchargers and L2 chargers, BC severely lags the states of Washington, Oregon and California and the Province of Quebec. Quebec's 2019

⁴¹ <https://www.sfchronicle.com/bayarea/article/Reports-Firefighters-respond-to-explosion-at-13916428.php>

⁴² https://electrek.co/2019/06/11/hydrogen-station-explodes-toyota-halts-sales-fuel-cell-cars/#disqus_thread

⁴³ On June 22nd, BC announced the MSRP limit was reduced to \$55,000 immediately and the subsidy cut to \$3,000.

⁴⁴ Ibid.

Budget provides for 28,200 new charging stations in Quebec over two years. In comparison, BC currently has only about 1,000 public L2 stations and about 55 L3 quick chargers installed⁴⁵. Tesla has a dozen Supercharger stations in BC, usually with 8 to 22 Superchargers at each location with another seven stations pending in 2019.

Going electric services thousands more users today and tens of thousands in the years to come and cuts GHG emissions several times more than hydrogen.

Recommendation:

1. *Stop the Hydrogen subsidies program and divert the money to increase the number of EV subsidies and dramatically increase the EV charging infrastructure in BC, especially high capacity DC chargers and Superchargers across BC's highway system.*
2. *Work with Tesla and other charging network providers and EV manufacturers to have their stations include multiple format hi-capacity DC chargers, i.e. Superchargers, CCS Combo and CHAdeMO chargers as well as the standard 220-volt J1772 connectors.*

Rebates- How much, for what (Zero Emission vehicles only or just those without fossil fuels involvement and hybrids)?⁴⁶

BC's 2019 Clean Energy Vehicle Program gives government rebates for new EV's, Plug-in Hybrids and Hydrogen vehicles and is advertised as *CEV for BC* which is a non-profit corporation created and administered by the New Car Dealers Association (NCDA)⁴⁷. BC has paid out \$40+ million in rebates since 2011.⁴⁸ The program runs until the earlier of March 31, 2020 or when the provincial grants program is exhausted.

The vehicle must cost less than ~~\$77,000~~ \$55,000 to qualify. Current new vehicles rebates after the June 22nd reductions are:

⁴⁵ <https://www.bchydro.com/powersmart/electric-vehicles/charging.html>

⁴⁶ Note: this section was prepared well before the province reduced the eligible purchase price and the maximum rebates on June 22nd. Rebates have been adjusted to match the new limits and have been noted in my recommendations which remain the more or less the same but were initially based on the original rebates.

⁴⁷ The NCDA had been a very active donor to political parties up until corporate donations were banned in 2018. From 1 Jan 2008 to the end of 2017, the NCDA donated \$1,239,870.58 to the BC Liberals and \$138,290 to the NDP.
[https://contributions.electionsbcc.ca/pcs/SA1SearchResults.aspx?FilerSK=0&EDSK=0&FilerTypeSK=0&Contributor=new+car+dealers&PartySK=5&elctrldstrct_sk=0&ED=\(ALL\)&FilerType=\(ALL\)&Filer=0&FilerName=\(ALL\)&Party=BC+Liberal+Party&event_name=\(ALL\)&class_sk=0&class_name=\(ALL\)&DateTo=2019%2f05%2f01&DateFrom=2008%2f01%2f01](https://contributions.electionsbcc.ca/pcs/SA1SearchResults.aspx?FilerSK=0&EDSK=0&FilerTypeSK=0&Contributor=new+car+dealers&PartySK=5&elctrldstrct_sk=0&ED=(ALL)&FilerType=(ALL)&Filer=0&FilerName=(ALL)&Party=BC+Liberal+Party&event_name=(ALL)&class_sk=0&class_name=(ALL)&DateTo=2019%2f05%2f01&DateFrom=2008%2f01%2f01)

⁴⁸ <https://www.cevforbc.ca/clean-energy-vehicle-program>

\$3,000 for a hydrogen vehicle

\$3,000 for a Battery Electric vehicle (BEV)

\$3,000 for a Plug-In Hybrid with at least a 15 kWh battery and 80 km EV range

\$1,500 for a Plug-In Hybrid or Hybrid with a range extension battery of 4 – 15 kWh and EV range of less than 85 km.

Leased vehicles are eligible for 100% of the rebate on 36-month and more leases, 66.7% for 24-month leases and 33.3% for 12-month leases. Fleet vehicles are only eligible if lease is 36 months or longer.

Used vehicles are not eligible under *CEV for BC*.

The federal government's new EV and Hydrogen vehicle iZEV rebate program began on May 1st, 2019 and will rebate \$5,000 for the purchase of a new EV or Hydrogen vehicle with a list price of less than \$55,000 or \$65,000 if 7 passenger or more. Plug-in hybrids with batteries 15 kWh or more qualify for \$2,500 with the same price limits. It is not clear if there is a limit on the number of vehicles that can receive a rebate annually like in BC.

It is reasonable to ask how instrumental BC's rebate has been in increasing the sales of Hybrids and EV's in BC? There does not seem to be any studies of who has benefitted from the program by income or other metrics. I'm sure BC's rebates have encouraged many people to buy an EV, and anecdotally, I hear that new EV sales rise as long as the rebates are offered and that used EV sales pick up when the new-car rebate quota is reached and the rebates end. However, also anecdotally, the rebate while welcome has not been the primary factor in the decision to buy a BEV or Plug-in Hybrid by most people I know who have an EV.

Probably, 80% of the Leafs, i3's and eGolfs one sees in Victoria did not receive rebates because they are used off-lease vehicles imported from the USA and not eligible for a rebate – until now, and then only if bought from a NCDA dealer. I doubt if many low-income persons have benefited from the rebate.

The money allocated annually for rebates historically gets used-up well before the fiscal year-end. In 2018, they ran out by June. A lower rebate, perhaps \$3,000 for a new BEV and \$1,500 for a used BEV would mean twice as many people could enjoy a benefit. While high rebates may have been necessary to encourage manufacturers and stimulate consumer interest in EV's and hybrids when they were being introduced, there is less need for large rebates today as the EV market is expanding rapidly as all the major manufactures, especially the European firms, are jumping on board and trying to catch up to Tesla which is the design and market leader in EV's and Nissan's Leaf which was the leader in more modestly priced EV's. In addition, the Federal iZEV rebate reduces the need for BC's initial rebate and opened room to reduce the per vehicle rebates and double the number of beneficiaries.

There is some evidence that high rebates enable the manufacturers and dealers to keep prices higher than they would be otherwise. In the USA, where Tesla has reached or exceeded the legislated objective of 250,000 vehicles sold, the Federal \$7,500 Rebate has been cut in half to \$3,750 for 2019 and will likely be eliminated soon for Tesla and Nissan, the lead manufacturers. In response, both manufactures

have reduced their prices in the past few months - with Tesla reducing prices a second time in mid-March 2019.

As BC has done, rebates should be weighted towards emissions: the lower the emissions the higher the applicable rebate. E.g. Pure EV's qualify for the higher rebates whereas the Plug-in hybrid's rebate is dependent upon emissions using size of battery and range as the proxy. A plug-in Hybrid with a 15 kWh or more battery and 85 km range will receive the same rebate as a BEV, a plug-in Hybrid with a 4 - 15kWh battery will receive half that rebate. Hybrids lacking plug-in capacity and dependent up braking regeneration alone no longer receive a rebate. Oddly, Hydrogen vehicles qualify for the maximum benefit despite Hydrogen's lifecycle emissions being higher than plug-in hybrids.

BC decided not to offer rebates on cars costing over \$77,000 which was cut to \$55,000 on June 22nd. While is defensible in some respects, it penalizes all Tesla models (Model S, X, and most Model 3's and the upcoming Model Y) only covering one or two versions of the best-selling Model 3. The Government of Canada's new program did the same eliminating all but one or two versions of the Tesla Model 3 and most other manufactures longer range vehicles with the same maximum eligible price of \$55,000.

It should be noted that the average price of all new passenger vehicles sold in BC in 2018 was approximately \$45,000.

Tesla⁴⁹ is the company that has taken all the risk in creating the whole market for BEV's, something that all the other established manufacturers, the finance and oil industries scoffed at and not only dismissed but actively sought to kill. Tesla relied upon those in society who had the means and the desire to dramatically reduce GHG's. By producing highly desirable expensive cars with higher marginal profits per unit, they earned the capital to invest in more affordable cars⁵⁰, which they are now producing in vast numbers. Tesla also built and is expanding the largest high capacity charging network in Canada and the world, including a dozen stations in BC with 20 planned by the end of 2019.

While BC and Canada like to promote innovators, in this case they continue to penalize the one firm that single headedly created the EV industry and is the most innovative in the history of the auto industry since Henry Ford and the company with possibly the highest BEV sales in BC.

Ironically, it seems that the sole eligible Tesla model is about the only qualifying EV you can purchase in BC today. If you want a longer-range KIA, Hyundai or Leaf, you have to wait months for delivery. However, Tesla's Vancouver store has been delivering between 50 and 120 Tesla's a day (mostly Model 3s), possibly making them the top selling model in BC.

⁴⁹ Point of clarification: I own a Prius and a Leaf but appreciate that there would be no EV industry without Tesla's innovation and commitment to building dynamic vehicles and making EVs desirable.

⁵⁰ The base price for a Model 3 is now \$54,590. While difficult to pin down (ICBC will have the data), the average price of a new vehicle (gas, diesel, hybrid, EV) purchased in 2019 is about \$45,000.

Comparing Quebec and BC's Programs to Reduce GHG Emissions in Transportation Sector					
Initiative	Conditions in BC	BC	Quebec	Conditions in Quebec	
Charging Stations		\$ / Subsidy	\$ / Subsidy		
Subsidy for Home & Work Charging* Charging Stations on Highways and Govt Bldgs.	Program still undefined	?	\$ 350.00		
Support for Fast Charging and Hydrogen Stations	Program still undefined	?			
Subsidy for Installation	Substantial portion for Hydrogen, still no details	?			
Subtotal Charging Station Initiatives	Not known if install assistance will be included in home program	?	\$ 250.00		
		\$ -	\$ 600.00		
New Vehicle Rebates					
Incentives for Buses & Medium and Heavy Duty Vehicles	Program details still to be announced	?			
All-electric vehicles	Under CEV for BC, price must be below \$77,000 after taxes are applied (\$55,000 after 22 June 2019). Vehicles must be purchased from members of the New Car Dealers Assn. (NCDA)	\$5,000, \$3,000 after June 22nd	\$8,000.00	If the manufacturer's suggested retail price (MSRP) is less than \$75,000:	
	Under Scrap-IT - 1,300 vehicles limit. Only available from NCDA dealers.	\$6,000.00	\$3,000.00	If the MSRP of the vehicle is between \$75,000 and \$125,000:	
Plug-in hybrid vehicles	If battery over 15 kWh, \$5,000 (\$3,000 after June 22nd), if between 4kW and 15kW, \$2,500 (\$1,500 after June 22nd)	\$5,000 -\$3,000 & \$1,500 after June 22nd	\$500.00, \$4,000.00 or \$8,000.00	If manufacturer's suggested retail price (MSRP) is less than \$75,000 (\$55,000 after June 22nd)	Rebate is calculated according to the electric battery capacity.
Hybrid vehicles	Regen only, not plug-in (like earlier Prius)	\$0.00	\$500.00	For the 2017 or earlier model years: no rebate starting with the 2018 model year.	
Hydrogen-powered vehicles	Vehicle Rebate	\$5,000 , \$3,000 after June 22nd	\$8,000.00	If manufacturer's suggested retail price (MSRP) is less than \$75,000:	
	Fuel credit	\$1,000.00	\$3,000.00	If the MSRP of the vehicle is between \$75,000 and \$125,000:	
Low-speed electric vehicles			\$1,000.00		
Electric motorcycles			\$2,000.00		
Mobility scooters	Via Scrap-IT	\$600.00	\$500.00		
Bus Pass	Via Scrap-IT	\$850.00			
Electric bicycle	Via Scrap-IT	\$850.00			
Car Share Credit	Via Scrap-IT	\$750.00			
Cash for qualifying vehicle	Via Scrap-IT	\$200.00			
Cas for non-qualifying cars	Via Scrap-IT	\$100.00			
USED EV REBATES					
Electric Vehicles	No general CEV rebates. Rebates are under Under Scrap-IT program only. There is a 200 vehicle limit to this rebate. Must be purchased from a NCDA member.	\$3,000.00	\$4,000.00 but only \$1500.00 for a Tesla	The pilot project will end as planned on March 31, 2019. However, following on from the provincial budget, used vehicles will in future qualify for rebates under the Roulez vert program	To qualify, the vehicle must be imported to Quebec from outside the province by a dealer, pass an inspection, be 3 to 4 years old and be warranteed by the dealer for 3 years or 40,000 km. and not subject to a previous Quebec rebate.
Overall Initiatives, Programs & Goals		\$ Millions	\$ Millions	2 year budget 2019-2021	
ZEV Purchase incentives	Point of Sale Incentives, Incentives for Light Duty Fleets, PR and implementation Heavy Duty trucks & buses	\$42 \$6 \$1 \$10	\$ 433.8	Extension of the Drive Electric program through 2021 with additional funding of \$433.8 million, which is expected to contribute to the purchase of about 66,000 electric vehicles and the installation of close to 27,500 charging stations, as well as more than 1,200 workplace charging stations.	
Charging Station Incentives	New public fast-charging stations and hydrogen fueling stations. Includes \$5 million for workplace charging stations. Much appears to be flowing to the Hydrogen fueling stations which cost \$1-\$3 million each	\$20	\$ 3.2	\$3.2 million in additional funding is provided to cover rebate applications in respect of workplace charging stations	
Importing used EV's from other jurisdictions			\$ 21.7	A total of \$21.7 million is allocated to encourage the purchase of used all-electric vehicles, now covered by the Drive Green program.	
EV tech training	To support the Clean Vehicle sector including training for automotive technicians and electricians		\$ 1.0	\$1 million over two years – to test charging infrastructure for electric vehicle fleets, to identify technical and operational challenges before installing infrastructure on a larger scale.	
			\$ 4.5	\$4.5 million for a two-year pilot project within driving schools to educate student drivers on operating electric vehicles.	
Zero Emissions Legislation	Implementing new ZEV legislation introduced April 10, 2019	\$ 3			
Active Transportation Support	Help with long term planning to encourage active transportation and look at better commuting options	\$ 6			
TOTAL COSTS		\$ 90.0	\$ 464	Total over two years	
Population		4,991,687	8,390,499		
ZEV incentives in \$ per capita		\$ 18.03	\$ 55.32		
GDP (\$Millions)		\$ 238,790	\$ 355,037		
GDP Per Capita		\$ 47,838	\$ 42,314		
Emissions Inventory for BC Mega Tonnes		62,300,000	78,000,000		
Emissions per capita (tonnes)		12.5	9.1		
* The CEV for BC's ZAP BC is privately funded via carbon credits					

By privatizing BC's program to the NCDA the program flexibility is limited, and it benefits the NCDA members significantly while ignoring all others and diminishes the credit the province gets for the money spent on the program – despite the rebates being funded fully by the provincial government.

It is next to impossible for British Columbians to negotiate a better price for a qualifying vehicle when the NCDA dealer has a \$1,500 to \$3,000 chit to give you if you pay the full price. If the program was run by ICBC as part of its Motor Vehicle Branch operations, they could ensure that the program is fairly distributed and award the rebate to the buyer at the time of registration. It would be easier to administer, and the province would get proper recognition for the program the citizens of this province fully fund.

Recommendations:

1. *Cut rebates in half to double the number of beneficiaries (Note: Province cut the CEV rebate to \$3,000 on June 22, 2019) ^{51, 52}*
2. *Limit hybrid rebates to half the BEV and phase out hybrids with less than 4 kWh batteries in two years.*
3. *Delegate the administration of the program to ICBC. Allow ICBC to benefit from any carbon credit off-sets available and compensate them ICBC for any net costs of administering the program.*
4. *Vehicle buyers would receive their benefit upon registering the vehicle. That payment could be made directly to the individual or the dealer.*
5. *Raise the maximum EV price eligibility criteria to \$115,000, but only give half the rebate on vehicles costing more than \$55,000. (Note: June 22nd province cut maximum eligible price from \$77,000 to \$55,000, see footnote 32)*
6. *Introduce rebates on imported used BEV's at half the new car rate.*
7. *Pressure the federal MOT to remove the probation on importing used Tesla's from the USA.*
8. *Pressure the Federal MOT to eliminate the RIV Fee on imported EV's (see section on this below)*
9. *Eliminate the rebates for Hydrogen vehicles after 2020 as they do not reduce CO2 emissions enough and it is doubtful that there will be a significant market for them due to costs and great efficiency of BEV vehicles. Redirect the money to expand the number of rebates for EV's.*
10. *Eliminate the subsidies going to those installing Hydrogen stations and use the money freed up to install more Level 3 fast charging stations on BC's highways.*
11. *Support Tesla primarily by assisting them with the buildout of their Supercharger network and work with Tesla to allow other makes to use*

⁵¹ Due to high demand, on June 22nd BC cut its rebate to a max of \$3,000 for BEV, Hybrid and Hydrogen Fuel Cell vehicles and \$1,500 for lower capacity Hybrids. They also cut the maximum value of a vehicle to \$55,000, the same as the federal program. However, the province added \$26.5 million to the program for 2019. <https://bc.ctvnews.ca/b-c-slashes-electric-vehicle-incentives-to-3k-1-5k-1.4478446>

⁵² <https://www.cevforbc.ca/eligible-cevforbc%E2%84%A2-vehicles>

adapters to connect to Tesla Superchargers where the car is capable of handling the higher voltage and amperage without damaging the cars. European Tesla Model 3s are now fit with a CCS Combo charging port and Tesla is adding CCS Combo cable to their European Superchargers⁵³. Why not have BC lead that charge in North America? Tesla now offers Tesla owners a CHAdeMO adaptor (US\$450) so they can charge at a CHAdeMO fast charger with the appropriate software upgrade

SCRAP-IT – Who benefits? Improving access and options

SCRAP-IT pays government money to BC residents who wish to scrap their existing gas or diesel vehicle and buy an EV. SCRAP-IT claims that since its inception in 1996, 46,148 vehicles have been scrapped. There are a number of incentives:

- \$6,000 to buy a new BEV or Hybrid with a battery greater than 15 kWh
- \$3,000 to buy a used BEV
- \$850 to buy an Electric Bike
- \$800 for a BC Transit Pass
- \$750 Car Share Credit
- \$600 to buy a mobility scooter
- \$200 cash, or
- \$100 cash for a non-qualifying vehicle

SCRAP-IT is not an open-ended program. For 2019, there are 1,300 x \$6,000 incentives for a new EV (value \$7.8 million) and only 200 x \$3,000 for a used EV (value \$0.6 million). They will likely run out within a couple of months.

SCRAP-IT makes some sense – it helps get gas-guzzlers off the road. But some vehicles now qualifying for SCRAP-IT are much more efficient than thousands of worse gas-guzzlers on the roads. I.e., should a small car that uses less than 8 l/100 km. city and still runs well be scrapped just because it is turned in under the program? When we bought our EV, we sold our 2004 Sienna van privately. It still worked perfectly well, only had 130,000 km and was still amongst the most fuel-efficient vans available, so it did not make sense to use the Scrap-it program. It consumed 8 L/100 km on the highway and 12-13 L/100 km in the city. High yes, but nowhere near as high as many newer vans and trucks and much less than older GM, Ford and Chrysler vans, SUVs and half-tons on our roads (our previous GMC Sierra van guzzled an average of 15 L/100 km).

Well running, relatively fuel-efficient vehicles should not be scrapped when turned in under the program but offered free or at a marginal admin cost of perhaps \$250

⁵³ <https://electrek.co/2018/11/14/tesla-model-3-ccs-2-plug-europe-adapter-model-s-model-x/>

to someone with a real gas-guzzler consuming 15-22+ L/100km that they turn in to be scrapped. This way BC gets rid of more big gas-guzzlers faster and the province helps those who cannot afford a new or a used EV to have a vehicle that is much more affordable for them to operate while reducing their emissions significantly.

Currently, there is little under the SCRAP-IT program or any other ZEV initiative for the poor and lower income people, who comprise a significant portion of British Columbians and who are struggling to make ends meet - other than an electric bicycle, a Car Share credit, \$200 or a bus pass, things that may not be practical or desirable for many lower income citizens.

SCRAP-IT is owned and run by and for new car dealers as a not-for-profit operation. It is in the NCDA's interest to run SCRAP-IT. It guarantees their members more new and used EV sales and eliminates the buyer's ability to negotiate a lower price on a new or used EV or hybrid. As with *CEV for BC*, where only a NCDA dealer has a \$3,000 or \$1,500 government chit to offer you, the customer can't effectively bargain for a better price. It stymies competition.

An individual or a dealer who is not a member of the NCDA importing a used EV (which is therefore new to BC and Canada and increases our low emission EV fleet) is ineligible. It is estimated that about 80% of the pre-2019 Leafs in Victoria are used Leafs imported from the USA by local dealers and sold in BC. When we imported our Leaf, we saved approximately \$7,000, all expenses and taxes included, compared to buying a similar one from a local dealer. This gives you an idea of just how much dealers are making selling used EV's. Now, the BC Government is going to subsidize them further by giving NCDA members exclusive rights to give out the rebates on used EV's. Don't expect the prices of used EV's to decline.

It makes more sense to have the ICBC run the SCRAP-IT program. ICBC is BC's default Motor Vehicle Branch as the province has delegated responsibility for registering and de-registering all motor vehicles in BC to ICBC. ICBC would more easily ensure that vehicles bound for the scrap yard are properly de-registered with the VIN's noted and the vehicles sent off to the scrap yards. Similarly, it could prevent double-dipping by disqualifying all EV's that had previously received a SCRAP-IT benefit from qualifying again as ICBC's VIN records flag vehicles that had previously received a benefit under the programs. Purchasers of an EV or Hybrid that is eligible for the subsidy would have it paid to them upon registering their new qualifying vehicle after scraping their old vehicle. As noted above, fuel efficient serviceable vehicles turned in under the program should be made available to persons swapping their gas guzzlers for one of these serviceable lower GHG emitting vehicles.

The SCRAP-IT program pays for its operating costs largely from revenues from the scrap dealers for the value of the scrapped cars and selling carbon credits/offsets to industry. Taking old gas guzzlers off the road reduces emissions which has a value in the world of trading carbon credits. From what I understand, SCRAP-IT sells the

value of the GHG reductions from removing these old cars from our roads as carbon credits to big carbon emitters like fossil fuel companies. To verify this, I contacted SCRAP-IT to obtain a copy of their Annual Report with financial statements so I could find out how much these carbon credits added up to. They refused, telling me that this was not information available to the public.

Recommendations:

1. *Delegate the administration of SCRAP-IT to ICBC.*
2. *Make the program available to anyone who wants to scrap their old registered vehicle(s).*
3. *Cut the maximum benefit by half so twice as many people can benefit.*
4. *Cover all used EV's that are "new to BC" under the program at half the value of a new vehicle's rebate.*
5. *Do not give rebates for used BC EV's as the vehicle has already benefited from a rebate so the price should be lower.*
6. *Keep the other benefits the same.*
7. *Allow anyone to turn in an unregistered vehicle to receive \$100.*
8. *Give serviceable vehicles turned in under SCRAP-IT to persons who scrap higher emitting vehicles subject to a modest administration fee of \$250.*
9. *Allow ICBC to claim any of available carbon-credits / offsets related to the vehicles scrapped.*
10. *Compensate ICBC for any net costs of operating the program (see below)*

Compensate ICBC for running provincial programs

ICBC must be compensated for running provincial programs.

For the past 20 years, ICBC has been delegated the Motor Vehicle Branch's job of registering vehicles in BC which means registering and maintaining the registry for both vehicles and drivers, collecting the registration fees and submitting 100% of the registration fees collected to the province. \$618.4 million was collected in Motor Vehicles and Drivers licences and submitted to the province in 2017-18.

It cost ICBC \$102.9⁵⁴ million in administration costs and another \$31.2 million in commissions to insurance agents who do much of the front office registration work. ICBC also paid for \$30.2 million in road improvements, mostly making intersections safer. No private auto insurer across Canada has to incur MVB and road improvement costs.

⁵⁴ From Note 17, 18 & 19 of the 2018 ICBC Financial Statements. "The Corporation is also responsible for collecting and remitting in full to the Province of B.C. all driver license fees as well as vehicle-related fees for acquiring and distributing licence plates and decals including permits and other fees and fines. These collections are not revenue to the Corporation. The costs associated with the licensing and compliance activities conducted on behalf of the Province of B.C. are borne by the Corporation."

All of this, totalling more than \$164 million should be refunded to ICBC to compensate the corporation for costs that are properly provincial expenditures and should be accounted for within the Province's operating budget. With ICBC losing over \$1 billion a year, it is unconscionable for the province to expect ICBC to continue picking up more than \$164 million dollars a year in what are clearly and properly provincial government operating expenditures.

Similarly, ICBC should be compensated for administering the *SCRAP-IT* and *CEV for BC* programs. This could be partially accomplished by allowing ICBC to charge and retain a modest fee, say \$250 for transferring the registration of scrapped gas guzzlers to more fuel-efficient serviceable vehicles turned in under the *SCRAP-IT* program. Over 46,000 vehicles have been scrapped under the program since 1996. If a quarter were serviceable, @ \$250 per swap, ICBC would have collected \$2.9 million. ICBC would also receive revenues from the sale of the vehicles to the scrap dealers and any carbon credits applicable. I understand this is the main source of revenue that pays for the NCDA's *SCRAP-IT* program. Carbon credits were trading on the Western Climate Initiative (WCI) auction at \$21 to \$23/tonne this Spring.

Recommendations:

- 1. Fully compensate ICBC for any properly provincial programs that it administers.*
- 2. Allow ICBC to retain any revenues it receives from the sale of scrapped vehicles, be it for a serviceable vehicle sold to someone turning in a gas guzzler to be scrapped or to the scrap dealers.*
- 3. Allow ICBC to sell carbon credits on the market for the vehicles scrapped.*

Inaccuracy and Slowness of Vehicle Sales/Registration Data in BC

BC vehicle sales and registration data are pathetic, in large part because the agency of registration (ICBC) does not have sufficient resources to do the job. It is hard to understand how government can build sound policy with such poor data. The most recent data ICBC has on their site as of June 2019 is from 2017 and it appears to be inaccurate with respect to EVs in particular, as the figure for Vancouver Island EV registration is only 1,800 and there are probably more than 4,000 in Greater Victoria alone. You can't drive for 5 minutes in Greater Victoria and not see several EV's.

It will prove next to impossible to administer the ZEV legislation without a significant upgrade of the MVB/ICBC data on vehicles registered in BC.

StatsCan data is also inadequate and does not even appear to have a category for EV's nor data on imported EV's – even though the import data is collected by the federal Registry of Imported Vehicles – which charges \$310 plus +GST for the privilege of importing a vehicle from the USA.

The car sales stats one sees reported by various private sales data companies are based on “new” car sales, so the number of EV’s in BC is dramatically under-reported because of the failure to include imported used EV’s in the EV stats.

ICBC has all this information. It should be easy for ICBC to tally and report these stats, even by municipality, on a monthly and yearly basis. Manitoba’s MPIC produced detailed stats for me almost 40 years ago, and software and database advances since then would make this a rather simple data extraction. It appears that it has never been a priority to report the data in a timely fashion as their primary focus is on insurance stats, not MVB registration stats – and they have little incentive to produce registration data because it has little value in their insurance operations and they cannot recover the costs of doing so from the province.

Recommendations:

- 1. Assign more resources to the motor vehicle registration function and direct ICBC to produce accurate, timely and regional data on vehicle registrations in BC, including the energy source.*

Commercial Vehicles- should they be included and should rebates apply to conversions?

Heavy duty vehicles emit 6.6 MT of GHG’s, 44% of the road transportation sector’s share. It is possible to make a bigger, faster dent in the commercial sector’s GHG’s emissions than in the passenger fleet because each truck consumes so much diesel.

Commercial buyers are usually least in need of assistance. It makes good business sense to buy EV’s and Hybrids as they significantly reduce operating costs. Tesla projects operating costs savings of \$200,000 in two years⁵⁵ with their Semi. Buying EV’s and hybrids is good public relations and businesses can write-off acquisition costs as business expenses. Accelerated write-off provisions increase the benefit.

It makes sense to initially include subsidies for heavy EV trucks and buses as they become available as these are new products to the market. Again, Tesla is leading the parade with their Semi doing road tests now and it could be in production in 2020. Price is C\$190,000 (475km range) to C\$230,000 (800 km range). Individually, replacing a diesel transport truck with an electric truck will have dramatic reductions in GHG’s per vehicle. Diesels emit unhealthy airborne particulate matter plus significant amount of nitrous oxide, which as noted earlier is 275 times as powerful a GHG as CO₂. As many trucks burn a hundred plus litres of diesel fuel daily, GHG emission reductions will add up quickly as heavy trucks are electrified.

However, the best value for the Province and the trucking industry will come in helping build the high-capacity charging infrastructure needed to accommodate

⁵⁵ https://www.tesla.com/en_CA/semi

heavy trucks, especially on the highways in the Interior. It would seem logical that BC Hydro be tasked with providing highway-based charging infrastructure while the province could financially assist trucking companies install charging infrastructure in their depots/yards. This is a lucrative new business for BC Hydro, and it should yield a positive cash flow for the utility. The federal Clean Fuel Standard⁵⁶ adds to the available incentives for BC Hydro.

It makes sense to include subsidies to BC Transit for electric busses and municipalities for electric and hybrid garbage & recycling trucks, which are already available on the market. Several EV bus manufactures are already available: BYD (China), Hyundai, New Flyer, Volvo, Mercedes, etc. China is by far the most advanced with some 421,000 electric busses in service compared to 300 in the USA⁵⁷ and likely a few dozen in Canada.

Natural gas conversions can make sense for garbage truck fleets (especially hybrids) where they can burn the natural gas coming off the landfills that have been capped like the CRD's Hartland landfill. This reduces diesel particulate pollution and replacing diesel with natural gas (that is often being flared off or using inefficiently generating lower value electricity with converted diesel generators) reduces GHGs like CO₂ and NO_x. The gas is "free" to the municipalities so their fuel costs would reduce and help pay for the conversion and building refuelling stations at the source of the gas, the landfills. An added bonus is that these diesel / natural gas conversions have been pioneered by a BC based company, Westport Fuel Systems.

Recommendations:

- 1. Focus subsidies on installing high capacity charging infrastructure for trucks at their depots and on the highways as electric trucks come to market*
- 2. Introduce a pilot rebate program that applies to heavy transport trucks as they become available.*
- 3. Finance pilot projects in the CRD and another municipality with developed gas recovery system in their landfill to introduce hybrid compressed gas garbage trucks.*
- 4. Assist BC Transit with the introduction of more battery electric buses and the charging infrastructure required on designated routes.*
- 5. Consider working with Canadian based New Flyer Industries of Winnipeg and other manufactures to introduce their BEV busses and charging infrastructure in BC's cities.*

⁵⁶ <https://www.canada.ca/en/environment-climate-change/services/managing-pollution/energy-production/fuel-regulations/clean-fuel-standard.html>

⁵⁷ <https://www.bloomberg.com/news/articles/2019-05-15/in-shift-to-electric-bus-it-s-china-ahead-of-u-s-421-000-to-300>

Appropriately Taxing New and Legacy Internal Combustion Engine vehicles annually for the GHG's they emit?

To significantly reduce GHG's it is absolutely essential that vehicles be taxed at registration on their GHG fuel consumption ratings / emission generation rate and those taxes should continue to rise by a predetermined schedule. If BC has any chance of meeting its GHG reductions goals, vehicle registration fees need to be set based on emissions on a progressive scale – the more the vehicle emits, the more it pays and the faster the costs increase.

I.e., any vehicle that consumes more than 10 litres per 100km should be assessed at rates several times the rate for a car that consumes less than 5 L/100km.

Registration fees need to be scaled and linked to fuel consumption/GHG emissions. Here's an example of what the fee structure could look and how it would work (note current registration costs and fuel consumption rates are estimates and for comparative purposes).

- Electrics would remain near their current costs for several years so small EV's like a Leaf or Bolt would pay about \$40/year, larger EV's like a Tesla Model S or Jaguar I-Pace would pay proportionately more if they use more energy.

ICE vehicles registration costs would go up \$30/litre/100 km. above the initial base of 5 L/100km (city driving), so:

- Prius Prime @ 3 L/100 km would stay at about \$40/year
- A Prius @ 5L/100 km. would remain at \$40/year
- Prius V @ 6 L/100km registration would be +\$30 for \$70/year
- RAV4 Hybrid @ 7 L/100km + \$60 to about \$120/year
- Corolla/Civic @ 8 L/100km would be + \$90 to about \$140/year
- RAV4 ICE/CRV/Impala/Venza @ 11 L/100km +\$180 to about \$240/year
- V-6 half-ton @ 13 L/100 km +\$240 to about \$300/year
- V-8 4x4 half-ton/Yukon/Rolls Royce @16 L/100km +\$330 to about \$440/year
- A heavy-duty half or ¾ ton or van @20 L/100km + \$450 to about \$570/year.

City registered cars could be assessed at the city fuel efficiency rating (used above) while rural would be a mix of 70% highway/30% city. Urban periphery could be 30% highway/70% city.

To reinforce the policy, the rates should go up \$5/litre each year for at least the next 5 years, with the base of 5 L/100 km rate falling to 3 L/100 km over 3 years.

Before any sale is finalized, the buyer should have to calculate their costs and emissions for each of the next five years to give them the cost of registering and operating the vehicle (using an average of about 12,000 km/year) and the emission they will produce in kilograms. Buyers would sign a legal declaration that they

understand that by purchasing or leasing this vehicle they will incur these costs for the next 5 years and recognize the emissions they will be responsible for.

No sale would be legal without a signed and registered declaration. It would be advisable to have the form filled out before an independent/neutral agency like an ICBC broker, as buyers must go through them to register and insure your vehicle. Sellers meddling with the customer would void the sales contract. The calculator would be available on-line so prospective buyers could do their homework before heading out to buy a car.

Just posting the fuel consumption on a window sticker is not enough. We've had them posted for decades and they have accomplished next to nothing, as evidenced by our collective purchasing decisions.

The same fee structure should be used for new and used vehicles. Vehicle owners who have disregarded the environment in previous buying decisions should not be rewarded for their decisions. No adults in this day and age have the excuse that they did not know their choice affects GHG emissions. Having a lower rate for used vehicles might even induce more people to buy used vehicles instead of more efficient newer ones.

If the province is intent on significantly reducing GHG emissions in the transportation sector, policies like this are essential. You can't achieve the needed dramatically lower GHG emissions in the transportation sector by carrots alone. And the sticks have to be significant enough that the consumer will feel the impact and make informed decisions that will result in reducing GHG's enough to meet provincial and national targets and eventually reduce the forcing of Global Warming.

A single measure like our 2.4¢ to 8.9¢ a litre carbon tax has proven totally ineffective, as BC's share of comparative gas-guzzlers (half-tons, SUV's and vans) in new vehicle sales has risen from about 47% in 2008 when the Carbon Tax was initiated to 72% in 2017. Multiple incentives are needed. No one can claim that GHG emissions has been top of mind for BC vehicle buyers.

Windfall Revenues – Investing them wisely to reduce our dependency on others and gaining immunity from fossil fuel price fluctuations

Implementing a purposeful, emissions-based registration system would dramatically increase provincial government revenues for the next decade or so, and then fall off as EV's become the majority of vehicles on the road. Vehicles registration revenues would likely increase by a factor of 4 to 6 times to \$2.5 to \$3.5 billion for 5 to 7 years then fall precipitously along with motive fuel taxes as the population transitions to EV's and other vehicles with very low emissions.

If the province is smart, it would invest these revenues to transform the province from oil and gas dependency to an electric economy. Currently, electricity supplies

only 17% of BC's energy consumption, with oil at 37% and natural gas at 30% and biofuels 16%⁵⁸, so we have a long way to go to eliminate our dependency on fossil fuels.

No longer would oil companies be able to rip off British Columbians with unjustifiable much higher gas prices in BC than anywhere else in the country if we electrified our economy.

No Alberta premier could threaten BC with an oil embargo or a substantial increase in the price of oil and gas products if we did not disregard our interior and our coastline with pipelines and more tanker traffic. Oil would no longer be a significant factor in our lives.

Our household has already achieved this. Since installing a high efficiency heat pump, we no longer use oil or gas in our home and have cut our gasoline consumption by some 70% by replacing a gas fueled van and car with a hybrid and a used EV. And we're saving thousands of dollars annually for doing so, despite driving more. Before long, our oil needs will be down to lubricating oil for bikes and wheel bearings. All of BC can do the same with a little effort, smarter policies and willpower and benefit financially like we have.

In the transportation sector, BC needs to build our vehicle charging infrastructure to lead the world instead of being a laggard. Instead of playing around with very limited number of rebates (only 1,200 new SCRAP-IT EV rebates available in 2019 and 300 SCRAP-IT incentives for used EV's bought at a NCDA dealer), make rebates available to everyone who buys a new to BC EV so that no-one is excluded for the next 3 to 5 years. This kind of commitment might even encourage the development of an auto industry in BC.

The revenues will enable greater support for home energy upgrades and the installing of more solar panels. We have reduced CO₂ emissions by 92% in our home and our annual costs by some 65%, despite effective Hydro rates increasing by nearly 50% in a decade. BC is really behind in solar roof-top installations. A program to encourage a dramatic increase in solar panels and eventually energy storage systems would increase our electricity supply, enhance the efficient use of our hydro system, provide power during BC Hydro system power outages and reduce family's energy costs. Subsidizing solar panel installations, BC would become more energy independent and families would save significantly in their energy costs for both their home and their EV's. There is no excuse for the building code to not require all new houses, row houses, condo's and apartments to be net zero today. The design and technology are readily available and the costs to achieve net zero are small compared to the long-term benefits in reducing operating costs, demand on the grid and GHG's.

⁵⁸ <https://www.nationalobserver.com/2018/10/18/news/lng-facility-will-prolong-chinas-reliance-fossil-fuels-renewable-energy-expert-says>

Recommendations:

1. *Implement a new fuel consumption/emissions-based registration fee system within a year or two.*
2. *Resist giving too many concessions for vehicles needed for work – there are or will be EV's that fit the bill by the time the new system is implemented.*
3. *Assign the same fee schedule for new and used vehicles.*
4. *Use registration revenue windfall to increase the number of subsidies/rebates available to purchase new and used EVs and Hybrids.*
5. *Use some of the windfall registration revenues to finance the electrification of BC's economy. I.e. assist people to dramatically reduce their home carbon emissions by upgrading the energy efficiency of their homes via increasing insulation, re-glazing with double or triple-pane windows, replacing oil and gas furnaces and inefficient base-board heaters with high-efficiency heat pumps, installing solar panels and home battery energy storage systems and building net zero homes.*
6. *If the government is not willing to assess sufficient royalties on the oil and gas industry, or fees to support the industry captured Oil & Gas Commission, use a small portion of the vehicle registration revenues to fund extensive methane monitoring of the oil and gas fields using the latest technology offered by firms like GHGSat and institutes like St FXU's Flux Lab.*

Federal Fees on Imported EV's and Lack of Rebates on imported EV's

BC has a perhaps temporary opportunity to encourage more people to import EV's from the USA. Some 70% of the pre 2018 EV's on the road in Victoria are used EV's imported by dealers and individuals from the USA. Many individuals have saved thousands of dollars by going down to Washington or Oregon and bringing a used, mostly "off-lease" EV back, tackling the rather simple importing regulations on their own. I saved \$7,000 doing so.

Importers must pay a Federal Register of Imported Vehicles (RIV) fee of \$310 to import any vehicle to Canada plus the GST at the Canadian border.

Canada and BC benefits via less emissions for most if not 90% of the life of the car. If Americans are not snapping these subsidized used EV's up, why not make it easier for Canadians to buy and import them? As noted earlier, Quebec has introduced this incentive in its 2019/20 Budget.

Canada and BC also benefit from the sales taxes collected on the car upon entry and registration and a chance to increase the number of EVs on our roads which are essential if BC hopes to achieve its emission reduction targets. ICBC benefits from a temporary transit policy costing \$75 for a few days coverage.

Recommendations:

1. *Pursue the Federal Government to eliminate the RIV fee for imported EV's.*

2. Encourage ICBC to deduct half their temporary transit policy premium from the new policy upon registering the vehicle in BC.

Federal Policies that counter efforts to reduce emissions in transportation sector

It may seem counterproductive, but the Federal Government continues two major regulations that support the production of higher CO₂ emitting vehicles.

The federal Ministry of the Environment's *Passenger Automobile and Light Truck Greenhouse Gas Emissions Regulations* allows Light Trucks⁵⁹, which comprise some 72% of new vehicles sold in Canada, to emit more CO₂ than passenger cars. The standards were set prior to 2011 and continue today although they are under review.

In 2016, a passenger car with a "footprint"⁶⁰ under 45 ft² emissions standards are 200 g/mile. A similar sized Light Truck (SUV) was allowed 245 g/mile or 22% more. By 2025, the standard will be 130 g/mile for the passenger car, but 160 g/mile for a similar Light Truck SUV, 23% more).

Larger passenger cars with footprints of over 55 ft², the 2016 standard was 275 g/mile vs. 350 g/mile for a similar sized or larger Light Truck/SUV/Van or 27% more. By 2025 passenger cars emissions will fall to 175 g/mile while the LT/SUV/Van will only fall to 275 g/mile or 57% more than the passenger vehicle.

One example of the perverse nature of the regulations is noted in the Environment Canada's discussion paper on the regulations. "Though all-wheel drive variants of a vehicle can have higher greenhouse gas emissions than a two-wheel drive variant due to the additional demands put on the engine, additional weight, and other losses, in some cases all-wheel drive configurations can be beneficial to manufacturers from a compliance perspective because light trucks have less stringent target values than passenger cars with equivalent footprints"⁶¹.

The other area of concern over Federal policy has to do with safety regulations. Light Trucks, especially half-tons have historically had less stringent safety requirements than passenger cars. Less stringent safety requirements mean lower design and manufacturing costs compared to passenger vehicles⁶². This has changed significantly over time, with the trucks catching up in many categories but some still do not match the crash test results common in most passenger vehicles. Part of the

⁵⁹ <https://pollution-waste.canada.ca/environmental-protection-registry/regulations/view?Id=104>

⁶⁰ A vehicles "footprint" is the wheel track x the wheel base and reported in square feet.

⁶¹ <https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/publications/automobile-truck-emission-regulations-discussion.html>

⁶² I had attempted to find up to date information from Transport Canada but no one responded to the request I left on their robotic answering system.

issue has to do with the design as vehicles built on a body-on-frame design do not absorb the impact of crashes as well those built with unibody construction.

In addition, larger vehicles like half-tons and large SUV's pose greater danger to pedestrians and other vehicles because of their mass.

Another self-defeating federal policy is Transport Canada's refusal to allow used Teslas to be imported from the USA into Canada. These are amongst the safest and most energy efficient vehicles on the planet. It may have something to do with the colour of the seat belt buttons, blue instead of red on US models – something that could be fixed with bright red finger nail polish. The prohibition runs counter to the stated goal to increase the adoption of EV's in Canada and makes no sense.

On a much broader scale, Canada's carbon tax regime needs to put Canadian manufactures on an even footing with foreign competitors by negotiating in all trade agreements provisions to allow Canada to assess our carbon tax on the embedded carbon in goods imported from nations without a carbon tax or on the differential when the exporting nation's carbon tax is less than Canada's.

Recommendations:

- 1. Assign the same environmental and safety regulations on SUV's, Light Trucks and Vans as we have for passenger vehicles.*
- 2. Allow Canadians to import used Tesla's into Canada*
- 3. Include the ability to assess Canada's carbon tax on imported goods in all trade talks so that they are taxed at the same rate as they would be in Canada and construct the regulations to assess the carbon embedded in imported goods.*

Offering Municipalities and First Nations Governments a New Source of Revenue by allowing them to Assess a Tax on Vehicles Registered in or Entering their Jurisdiction if the Province is Unwilling to Assess Higher Registration Fees on ICE vehicles

Municipalities spend up to 40% of their budgets on streets and policing them yet receive very little if any revenue that is vehicle based. In the CRD, the only municipality with any significant revenue from vehicles is the City of Victoria, and that revenue is gained from parking revenue, via street meters, parking garages and parking fines.

Out cities are becoming more and more congested. Government's respond to that by spending billions on new bridges and interchanges. The province continues to prohibit municipalities to introduce Congestion Charges like London did years ago and other crowded cities are following their much less expensive example.

Municipalities and First Nations governments should be allowed to assess a tax on vehicles registered in their jurisdictions. It would be collected at registration and transferred to the appropriate municipality by the registrar, ICBC.

If the province is unwilling to use the “stick” of stiff emissions related registration costs, it could allow municipalities to assess them using a provincial determined rate structure. (You cannot expect the registrar (ICBC) to accommodate dozens of different rate structures.) This would broaden Municipalities’ revenue base and allow a reduction in property taxes.

There is a precedent for this in the tobacco and marijuana use regulations. Rather than the province setting the regulations itself, they turned the authority over to the WorkSafe BC who regulated tobacco consumption in work places to protect workers from the hazards of second-hand smoke and to regional municipalities initially and now regional health authorities to deal with smoking in public places. It has been remarkably successful with the strategy of limiting where you can smoke, and no doubt helped by the extremely high provincial taxes on tobacco that have really made people think twice about whether they continue lighting-up.

If the province implements the registration scheme as recommended, municipalities should still be allowed to assess a lesser tax on vehicles registered in their jurisdiction. For example, Municipalities could cut property taxes by \$100 per residence but add a new vehicle ownership tax of \$100/vehicle registered at that household. It might also encourage more people to do without a car or reduce the number they have, lessening the number of cars jamming driveways, yards and streets. Municipalities should also be allowed to assess a tax/fee on non-registered cars, something they could use their By-law officers to enforce. This might discourage people keeping excess vehicles in their yards and lessen the blight of old junkers left in yards and on the streets and frequently leaking oil.

Recommendations:

- 1. Introduce legislation to allow municipalities (including regional governments) and First Nation’s governments to collect fees from residents on vehicles registered in their jurisdiction and on un-registered vehicles located in their jurisdiction.*
- 2. If the province will not implement the emissions-based registration fees, all the Municipalities to do so. Create a scale that can be used by municipalities and First Nation’s governments to assess and collect the fees on registered vehicles.*
- 3. Arrange with ICBC to collect these revenues at the time of registration and establish payment mechanisms to transfer the money to the municipality or First Nation.*
- 4. Work with municipalities to facilitate a system whereby they can assess and collect fees on non-registered vehicles located in their jurisdiction.*

5. *Introduce legislation to allow cities to introduce congestion charges with the revenues flowing to enhancing public transit and alternative commuting options like safer biking and walking routes.*

Should there be Advertising Restrictions on Vehicles with High Carbon Emissions?

BC and Canada prohibit or severely restrict the advertising of alcohol, tobacco and now marijuana products because they are a threat to public health and safety or just undesirable and subject to abuse. Yet GHG emissions are a far greater threat to public health and safety than either of them. While the former damages are primarily to individual (cancer, COPD, drunkenness, family instability, etc.) GHG induced Global Warming is threatening the very survival of our society let alone our survival as a species and most other species in our oceans and on earth.

The auto industry spends a bundle on advertising, in the range of \$1,000 per vehicle sold with some brands up to \$3,300 per vehicle⁶³. Watching TV and reading newspaper ads, it appears that some 80% of this advertising is on trucks and SUV's.

There is little doubt that this contributes to 72% of BC's new vehicles sales being half-ton trucks, SUV's and Vans all of which consume 30% to 400% the fuel than available gas cars do.

Why not treat these gas guzzlers like tobacco and alcohol? Ban advertising on any vehicle, new or used, that consumes more than 8L/100 km. and reduce that to 5L/100 km over 5 years. Arguably, these gas guzzlers are doing far more harm than tobacco and alcohol. Eliminate hyping the "cool factor" from these products and we'll have a similar impact that we've witnessed with tobacco sales.

Sure, the auto industry, dealers, advertising and oil industries will have a bird, but they could still advertise their EV's and Hybrids and other low emission vehicles and the birds could fly in less polluted air and their habitat not disappear.

Recommendation:

1. *Ban advertising on vehicles that consume more than 8L/100 km (city rating) reducing that to 5L/100 km over 5 years.*

⁶³ "...In an email to investors, Global Equities Research Analyst Trip Chowdhry (via [Benzinga](#)) revealed the wildly varying amounts spent on ads by several of the world's major carmakers. According to Chowdhry, the industry average is \$1,000 per vehicle sold (in the US market in 2015). Most of the biggest spenders are luxury brands: Jaguar (owned by Tata of India) leads the pack, spending \$3,325 in advertising per vehicle sold. Lincoln is in second place with \$2,550 per unit. Oddly, Fiat/Chrysler is in a close third place, followed by Lexus and Cadillac...."

Carrots and Sticks

Like most other jurisdictions, BC has chosen carrots over sticks to reduce GHG emissions: rebates and government expenditures over regulations and taxes used as disincentive tools.

This is exactly the opposite of the successful approach used to change consumption behaviour with tobacco and to a lesser extent with alcohol but parallels with decades of unsuccessful programs like trying to get Canadians to invest in their retirement via voluntary contributions to instruments like RRSPs and direct contribution pension schemes. A third of Canadians don't possess RRSP's and those that do average less than \$70,000 in their accounts, enough to cover only a few years of retirement income. DC plans cannot provide a decent pension because contributions are too low so there is not enough money to compound over time to produce a pension.

Regulations can be very effective, especially when combined with taxes, sin taxes if you wish. Grease them with modest incentives and government reduces the pain and instils some sense of gain.

If we are not prepared to tax negative behaviour and combine that with some carrots, we will leave the hard decision to our children and grandchildren. They will have fewer and fewer options and may well have to resort to the heavy hand of legislative prohibitions like outlawing the use of let alone the sale of new and used gas and diesel vehicles well before 2040. Ireland has just announced their intention to ban the sale⁶⁴ of new ICE vehicles after 2030 in addition to quadrupling their carbon tax to \$120/tonne by 2030.

Norway can afford to use carrots (temporary measures like free ferries for EV's, free EV parking, free EV charging, HOV lane use for EVs, low sales/registration taxes on EVs, etc.) because it has been mature enough to accumulated spectacular wealth from its oil and gas resources by not using non-renewable resource revenues to cut other taxes and subsidize societal daily operations. It can afford the level of subsidies necessary to seduce its population to move from ICE vehicles to EV's. BC does not have that luxury because we have nothing to show for the vast resources that were shipped out of BC, be it fish, raw logs and other forest products, natural gas or coal. But even with their sovereign wealth fund, Norway's primary incentive is high taxes on ICE vehicles, a very big stick⁶⁵.

⁶⁴ <https://www.theguardian.com/world/2019/jun/17/ireland-to-unveil-bold-plan-to-tackle-climate-emergency>

⁶⁵ https://www.greencarreports.com/news/1123160_why_norway_leads_the_world_in_electric_vehicle_adoption?fbclid=IwAR2msLPpEjA9RAfjMONSNwG4-9DwpZq1W8rGeINqZ_4yXUPiMGxc2wAatwQ

We don't have another 20 years to waste with soft nudge measures that have had no real impact to date in reducing GHG's in most Western Societies, let alone BC. Our per capita emissions remain amongst the highest in the world, and they have been rising over the past 25 years, not falling. Any slowing of growth can be attributed more to the closing of energy-intensive heavy industries than our daily habits.

The steadfast fear and refusal to use available and proven regulatory and taxation instruments will ensure that British Columbia cannot achieve the rapid reductions in GHG's that our children and future generations require.

Recommendation:

- 1. Implement an effective combination of sticks and carrots to enable BC to meet the mandatory challenge of rapidly slashing our GHG emissions.*

Conclusion

BC's initiatives to date have failed to decrease BC's GHG emissions, especially in the transportation sector. Sales of petroleum products for the transportation sector continue to increase, in large part due to British Columbians buying personal vehicles like light trucks & SUVs that are larger and consume much more fuel than readily available alternatives like passenger cars, hybrids and EV's.

BC is already witnessing the disastrous impact of Global Warming: the Mountain Pine Beetle population explosion which killed BC's pine forests covering the size of New Brunswick, the rapidly increasing incidence and extent of forest fires (both 2017 and 2018 set new records), more frequent and higher spring and summer flooding, repeated failures of oyster farms due to ocean acidification and the warming of our Georgia Strait waters, grossly depleted salmon stocks due to warming events in the North Pacific and warming rivers and the rapid melting of our mountain glaciers are just seven of the readily noticeable impacts just 1.1°C of Global Warming has unleashed.

We readily spend hundreds of millions fighting forest fires, evacuating communities subject to flooding and rock slides, building dykes and rebuilding infrastructure that will only last until the next big storm or drought.

Scientists monitoring permafrost melt in across a 700 km. transect of Canada's Arctic just released a report stating that the degree of permafrost melting is 70 years ahead of what was forecast just a few years ago⁶⁶. This should be alarming to Canadian governments and society at large as melting permafrost emits methane as the ground melts and the rate of decomposition takes off. And it is happening in our Northern back yard.

Yet some politicians and others incite distrust and ignorance by leading the charge against any measures that reduce the GHG's that are the root of the ever-increasing

⁶⁶ <https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2019GL082187>
<https://weather.com/science/environment/news/2019-06-14-permafrost-melting-sooner>

problems Global Warming creates, and that will overwhelm civilization in a matter of a generation or two. Others claim to understand the crisis the world faces yet can't resist one more fossil fuel megaproject. (see Appendix 1)

Exercising leadership in reducing GHG's is the only sensible way forward. As one of the world's top GHG emitters on a per capita basis, the rest of the world will not look kindly upon us if we remain such laggards in cutting emissions.

While a ZEV initiative is welcome, it seems that BC has chosen a path of minimal commitment with goals (EV sales) so low that they will happen without this legislation because the world's automotive market is changing, just like a decade ago when cathode ray tube TV's were replaced by LED's in no time at all.

BC cannot accomplish the rapid reduction in transportation GHG reduction with carrots alone. We need to apply a combination of strong regulatory and tax measures plus persuasion measures that give BC a fighting chance of reducing GHG's dramatically over the next decade and eliminating them within 30 years.

It won't be easy. We need to count carbon as carefully as we count dollars.

It takes courage and a will that is as great as that needed to fight a war.

Appendix 1 - Impact of recently announced LNG and Trans Mountain Pipeline on GHG emissions

And then there are the measures that undermine BC's goal to reduce emissions.

The fight is that much more difficult when the province and federal government invest in projects that produce enormous amounts of GHG's. Entering into agreements with huge tax concessions to build massive LNG facilities whose emissions will swamp all efforts citizens and the province make to cut emissions elsewhere such as in the transportation sector only breeds distrust and cries of hypocrisy at a time when trust, our most valued characteristic is declining dramatically and threatening democracies around the world.

Flaunting a \$40 billion totally foreign and primarily Asian owned and misleadingly named LNG Canada⁶⁷ mega project billed as clean gas is beyond credulity. Declaring it "clean" because it uses vast amount of highly subsidized hydro generated electricity to pipe and compress the natural gas to LNG stretches credulity further. This completely ignores the 70 MT of GHG emissions that will be released in the countries in which LNG Canada's eventual 28 MT of LNG is burned annually

⁶⁷ Ownership of LNG Canada is:

40% Shell

25% Petronas (Malaysia)

15% Petro China

15% Mitsubishi (Japan)

5% KOGAS (South Korea)

0% BC or Canadian

According to a study by Globe Advisors for the BC Climate Secretariat in 2014⁶⁸, a 28 MT “clean” LNG plant would mean BC based emissions (including fracking and transportation to the plant) of 14 MT of GHG’s in BC and an additional 70 MT in the destination countries for a total of 86 MT of GHG including shipping emissions. That’s 138% of BC’s declared total 2016 GHG Emissions Inventory of 62.3 MT CO₂e.

Fugitive methane emissions from fracking operations, pumping stations and processing is a critical factor that has been grossly under-reported for far too long and tolerated if not assisted by the industry facilitating regulator, the BC Oil and Gas Commission. This is critical as methane is a much more powerful GHG than CO₂. Methane’s Global Warming Potential (GWP) over 10 years is 108 times CO₂, 86 times CO₂ over 20 years and 34 times CO₂’s GWP over 100 years according to the most recent report by the IPCC⁶⁹. So timing is critical and with such high GWP in the shorter timeframe, the Earth can ill afford any rush to LNG.

The government’s PR release claims the new LNG facility’s emissions is only 3.45 MT⁷⁰. The province’s ultra-low emissions tally only includes the plant’s operation itself and ignores the emissions in fracking (which we know from the Flux Lab’s work is grossly underestimated, with their results in the Montney region as much as 2.5 times more than recognized by the BC Oil & Gas Commission), transporting via pipeline to Kitimat, ocean shipping to markets and the 70 MT when finally burned. There is no guarantee that this LNG will be used to replace cheaper coal use in Asia or elsewhere, in fact it will extend dependency on the very fossil fuels we need to eliminate⁷¹. In fact, there are ample studies that illustrate that LNG made from fracked natural gas is no cleaner than coal⁷².

The Earth and its atmosphere and oceans could care less in which country the emissions occur; it is total GHG’s that must be measured and counted. To say otherwise is equivalent to saying China has no responsibility for all the fentanyl shipped from China or Columbia has no responsibility for the cocaine exported from Columbia. And GHG are far more destructive than the nasty fentanyl and cocaine. Fentanyl and cocaine destroy individuals; GHG’s are well on their way to destroying civilizations and the World as we know it.

BC has gambled hundreds of millions of dollars into its natural gas industry on supporting it with roads and electrical infrastructure. The latest being a \$290

⁶⁸ https://www2.gov.bc.ca/assets/gov/environment/climate-change/ind/lng/british_columbia_lng_greenhouse_gas_ghg_life_cycle_analysis.pdf

⁶⁹ Robert W. Howarth, “A bridge to nowhere: methane emissions and the greenhouse gas footprint of natural gas,” *Energy Science & Engineering*, 2014, pp. 1, 7.

⁷⁰ <https://news.gov.bc.ca/releases/2018PREM0073-001910>

⁷¹ <https://www.nationalobserver.com/2018/10/18/news/lng-facility-will-prolong-chinas-reliance-fossil-fuels-renewable-energy-expert-says>

⁷² <https://www.ucsusa.org/clean-energy/coal-and-other-fossil-fuels/environmental-impacts-of-natural-gas#.XAm4omhKjIU>

million investment by BC Hydro in two parallel 230 KV lines from Site C to an area east of Chetwynd to supply electricity to power natural gas operations with \$83.6 million from the Federal Ministry of Natural Resources “promoting a greener way of life for all British Columbians”⁷³, a perverted effort if there ever was one as BC’s “clean” natural gas will add millions of extra tonnes of CO₂ into the atmosphere in its lifecycle. There is no other need for a 230 KV transmission line in this wilderness area.

BC’s tax expenditures/concessions to the gas industry will now increase into the billions with the recently approved LNG plant in Kitimat. BC’s new LNG legislation eliminates the LNG tax, eliminates PST on construction materials for the \$40 billion plant and significantly reduces its carbon tax if the plant meets as yet undefined emission targets⁷⁴. This is on top of low third-world level royalty regime that collects negligible revenues with its low rates and all the tax credits handed out including accelerated capital write-offs, the negligible cost for water used in drilling and processing, and electricity supplied at a fraction of the cost of Site C electricity which equals a huge subsidy⁷⁵ in itself.

The value of these cumulative concessions and subsidies will add up to multiple billions of dollars over the years. Don’t be surprised if more subsidies are not demanded in the years to come – especially with gas prices set to tumble with the development of the West Texas Permian fields. Also, don’t be surprised if there is next to no net benefit to BC (BC government claims \$22 billion in long-term revenues) once the clean-up costs of abandoned well sites and pipelines are included as well as the extensive various environmental costs of the natural gas exploration and extraction industry. Alberta is facing billions of dollars in abandoned well clean-up costs, the latest example being \$329 million to clean up Trident Exploration Corp’s 4,700 wells being transferred to the Alberta Energy Regulator on Trident’s insolvency⁷⁶.

BC’s investments in natural gas industry is accelerating at a time when the fracking industry has not made any money in decades and the prospects are falling not rising. It is estimated that the shale gas and oil operations have lost over \$280 billion in the past decade in North America, including Canadian fracking operations⁷⁷. And there are no profits in sight, with natural gas being sold at negative prices in the massive

⁷³ <https://www.alaskahighwaynews.ca/site-c/feds-pump-83-million-into-peace-electricity-plan-1.23796000?fbclid=IwAR3vgbTtSoBG-AlltBIHcK4VvNb8nAKgPe0YYjlr6sZwq9UbUWoTOsR-FEc>

⁷⁴ <https://biv.com/article/2018/03/bc-government-gives-major-tax-breaks-lng-canada>

⁷⁵ <https://www.policynote.ca/tax-breaks-and-subsidies-for-bc-lng/>

⁷⁶ <https://www.theglobeandmail.com/business/industry-news/energy-and-resources/article-collapse-of-trident-exploration-threatens-to-more-than-double-orphan/>

⁷⁷ <https://www.desmogblog.com/2018/04/18/finances-great-american-fracking-bubble>

Permian basin in West Texas⁷⁸ due to the rapid expansion of fracking to find yet more oil which is producing massive amounts of natural gas as a by-product.

To add insult to injury, BP's June 2019 Statistical Review of World Energy⁷⁹ states that in 2018 Global emissions grew at their fastest rate in 7 years and the increase was led by burning natural gas.

On June 17, 2019, the Parliament of Canada declared that there is a Climate Emergency⁸⁰ caused by fossil fuel use.

The next day, June 18, 2019, the Federal Cabinet approved tripling the capacity of the Trans Mountain Pipeline to 890,000 bbl. of bitumen per day⁸¹. At capacity, this means that pipeline's bitumen will produce additional lifecycle emissions of 181.916 million tonnes⁸² of CO₂e per year, or 2.92 times BC's total 2016 GHG Emissions Inventory. Again, this kind of decision swamps citizen's and most industry's collective actions to reduce GHG emissions.

In the past few months Canadian governments have announced two new fossil fuel mega projects that will add some 206 MT of GHG emissions our earth's atmosphere. Forgive citizens, especially the youth of BC, Canada and the world for being cynical.

Frequently, chasing jobs in the resource sector ends up scuttling worthy efforts made in other areas that would create far more jobs and in a more decentralized and ongoing manner. This will be the case with BC's massive expansion of the natural gas exploration and entry into the LNG industry which will thwart all of BC's other worthy efforts to significantly reduce GHG's on our roads and in our homes and businesses.

Appendix 2 - Acronyms used

Acronym	Meaning
BEV	Battery Electric Vehicle – used interchangeably with EV
CCS	Combined Charging System - European standard for fast DC charging
CHAdeMo	Japanese DC quick charging system
CEV	Clean Energy Vehicle programme administered by NCDA.
DCFC	Direct Current Fast Charge
EV	Electric Vehicle

⁷⁸ <https://www.desmogblog.com/2019/02/07/north-america-natural-gas-fracking-financial-crisis-investors>

⁷⁹ <https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html>

⁸⁰ <https://www.ctvnews.ca/politics/canada-s-house-of-commons-has-declared-a-national-climate-emergency-1.4470804>

⁸¹ <https://www.bennettjones.com/Blogs-Section/Trans-Mountain-Pipeline-Expansion-Project-Approved>

⁸² <https://2012-keystonepipeline-xl.state.gov/documents/organization/221247.pdf> Table 6-3, pg.

FCEV	Fuel Cell Electric Vehicle- a hybrid powertrain using highly compressed Hydrogen (H2) in a fuel cell to charge a battery, and then electrically drive the vehicle
GHG	Green House Gases
GWP	Global Warming Potential – with CO ₂ as the base measure
H2	Liquefied Hydrogen- in commercial amounts usually steam reformed Methane, or from collecting sewage/land fill Methane, but may be created by subjecting water to electrolysis to break oxygen from the two Hydrogen in H2O.
ICE	Internal Combustion Engine- gasoline, diesel, natural gas combusted to drive a vehicle
J1772	Standard 220 volt AC charging connector
L1, L2, L3	Capacity of charging station. L1=120v, L2=220v, L3 High capacity fast charger 440 volt and more
LDV	Light-Duty Vehicle- no BC definition exists
LNG	Liquefied Natural Gas- Methane chilled and compressed
NCDA	New Car Dealership Association- BC
PHEV	Plug-In Hybrid Vehicle- a hybrid vehicle with a battery only driving capability charged by an off vehicle electric source.
ZEV	Zero Emissions Vehicle

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